

April 25, 1986

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Dear

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:

Enclosed is the latest market analysis report from INPUT's Federal Information Systems and Services Program, Federal Telecommunications Market, 1986-1990. The report includes market perspectives both from federal agencies and from 25 vendors of telecommunications systems and services.

INPUT estimates that the federal telecommunications market will increase from \$2.6 billion in 1985 to \$3.9 billion by 1990, at an average annual growth rate of 8%. Detailed estimates for leased telecommunications services, telecommunications hardware, and related professional services also are contained in the report.

In addition to the forecast, the report provides an analysis of competitive forces, agency preferences, and potential strategies for winning business in the federal telecommunications market.

If you have any questions about this report, please call us.

Sincerely,

John E. Frank
Vice President

JEF:ml

Enclosure





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FEDERAL TELECOMMUNICATIONS MARKET
1986-1990



FEDERAL TELECOMMUNICATIONS MARKET, 1986-1990

ABSTRACT

INPUT estimates that the federal government telecommunications market will increase from \$2.6 billion in 1985 to \$3.9 billion by 1990, at an average annual growth rate of 8%. This forecast reflects both higher than expected expenditures in 1985 and slower growth through the rest of the 1980s.

Many federal agencies responded quickly to the effects of the AT&T divestiture by acquiring networks and telephone systems in anticipation of future cost increases and mission requirements. These recent acquisitions, coupled with federal budget constraints, have created an increasingly competitive environment for the federal telecommunications dollar.

The report highlights major defense and civilian telecommunications initiatives scheduled for implementation in the late 1980s, with special emphasis on systems such as GSA's FTS 2000 and DCA's Defense Switched Network. The report also examines the impacts of regulation, policy, and standards on future federal telecommunications acquisitions.

Other major issues covered in the report include:

- OSI standards.
- Technological impacts.
- Competitive trends.
- Industry reactions to GSA telecommunications initiatives.

This report contains 188 pages, including 31 exhibits.



FEDERAL TELECOMMUNICATIONS MARKET 1986-1990

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FEDERAL TELECOMMUNICATIONS MARKET 1986-1990

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I INTRODUCTION

- This report on telecommunications systems and services in the federal government was prepared as part of the Federal Information Systems and Services Program (FISSP).
- Research for this report is based upon an analysis of the INPUT Procurement Analysis Reports (PAR), previous INPUT research conducted from 1981 through 1985, discussions with FISSP clients, interviews with federal government agencies, and interviews with vendors of communications products and services who market to the federal government.

A. SCOPE

- This report covers those telecommunications systems and services programs listed in the OMB/GSA/NBS Five-Year Plan for government fiscal years (GFY) 1986-1990, related federal agency long-range automated data processing (ADP) plans, and federal agency GFY 1985 and 1986 information technology budgets.
- The agencies selected for interview were identified in one or more of the above plans as current users of telecommunications services or products. Major users of commercial leased telecommunications services were targeted for additional in-depth analysis.

- The vendors selected for interview were identified as contractors of record for ongoing programs or listed as vendors for telecommunications services or products in INPUT's Company Analysis and Monitoring Program data base for 1985.
- The period of interest is GFY 1986 to 1990. Although GFY 1986 will be more than half over by the time of publication for this report, it will serve as the baseline for discussion of existing programs and as the point of departure for market forecasts.

B. METHODOLOGY

- The OMB/GSA/NBS Five-Year Plan analysis for the INPUT Procurement Analysis Report was reviewed for communications programs initiated during the period of interest.
- Original agency A-11 submissions were reviewed for additional information on communications requirements embedded in distributed data processing and office automation programs.
- The available agency long-range ADP plans for GFY 1985-1989 and GFY 1986-1990 were researched to identify plans for major telecommunications systems and services contracts.
- Annual reports for agencies with regulatory, standards, or policy roles were examined to determine future guidelines for federal telecommunications acquisitions.
- Questionnaires were developed for interviews of both federal agency officials and telecommunications vendor executives.



- The agency questionnaire was designed to acquire information about plans for future use of telecommunications systems and services.
- The vendor questionnaire was designed to acquire industry status and future federal market plans.
- Both included similar questions about contracting policy and preference, technical standards, and vendor performance perceptions.
- Copies of the agency and vendor (industry) questionnaires are included in Appendix F.
- Federal agency officials selected for interview included:
 - Executives (policy).
 - Contracting officers (buyers).
 - Program managers (users).
- Vendor executives selected for interview included:
 - Company executives.
 - Marketing executives.
- To uncover the differences among agency respondents to the questionnaires, the data was analyzed in several groupings.
 - Type of agency--civilian and defense.
 - Primary agency function--telecommunications policy, standards, procurement, or use.



C. REPORT ORGANIZATION

- This report has been organized into the following major sections:
 - Executive Summary.
 - Market Analysis and Forecast.
 - Agency Requirements.
 - Competitive Trends (including INPUT's recommendations to vendors).
 - Key Opportunities.
- Several appendices are provided to aid in report use.
 - Interview Profiles.
 - Definitions.
 - Glossary.
 - Policies, Regulations, and Standards.
 - Related INPUT Reports.
 - Questionnaires.







II EXECUTIVE SUMMARY

- This Executive Summary is designed in a presentation format to help the reader review key research findings and recommendations quickly. It also provides an executive presentation complete with script and visual aids to facilitate group communications.
- Key points of the entire report are summarized in Exhibits II-1 through II-8. The left-hand page facing each exhibit contains the script that explains the content of the exhibit.



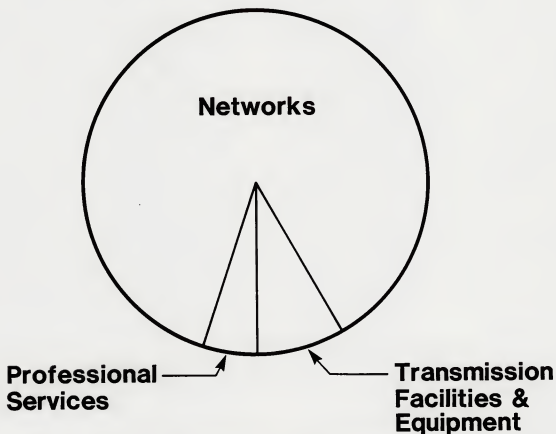
A. FEDERAL TELECOMMUNICATIONS MARKET SEGMENTS

- This market forecast focuses on several specific types of telecommunications systems and services commercially acquired by the federal government.
 - Networks, such as common carrier, value-added, local-area, and wide-area, representing approximately 87% of telecommunications procurement.
 - Transmission facilities, such as cabling, switching equipment, and satellite ground stations, representing approximately 8%.
 - Professional services, such as network design, installation, and equipment maintenance, representing approximately 5%.
- The forecast also includes some telecommunications hardware and services acquired as part of other information technology programs, such as:
 - Office automation or information systems.
 - Distributed data processing.
 - C^2 and C^3 .
- Local telephone service and the communications components of many intelligence and defense systems are funded by the government outside of agency information technology budgets and consequently fall outside the scope of this market forecast.



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**FEDERAL TELECOMMUNICATIONS
MARKET SEGMENTS**





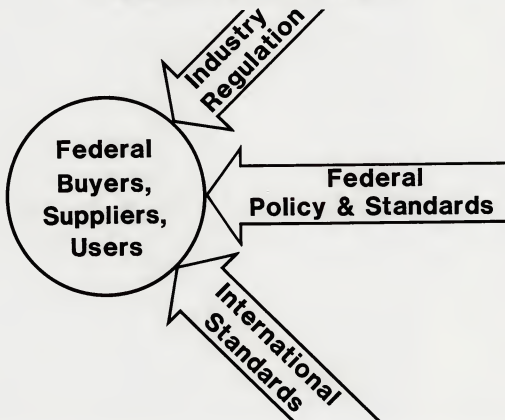
B. MARKET ENVIRONMENT

- The federal telecommunications market is shaped both by the procurement activities of the agencies and by a variety of regulatory, policy, and standards influences.
- Most federal agencies are both direct buyers and users of telecommunications systems and services. Several agencies, however, function primarily as buyers or resuppliers of telecommunications resources for other agencies.
 - GSA, through the FTS, WITS, ASP, and POTS programs.
 - DCA.
 - U.S. Air Force as DoD executive agent for AUTOVON.
 - Defense Commercial Communications Office.
- Other federal agencies influence the market primarily through regulation, policy, and standards activities. These agencies include the FCC, NCS, NTIA, NBS, OMB, and NSA.
- Since federal telecommunications access extends outside the government and across international boundaries, the market also is subject to external pressures from:
 - International organizations such as CCITT, CCIR, ISO, and the ITU.
 - National industry organizations such as NATA and ANSI.
 - PTT authorities in foreign countries.



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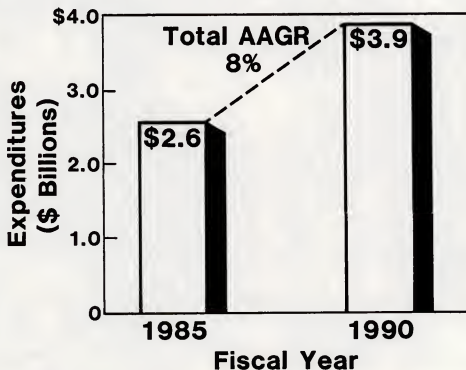


C. MARKET FORECAST, 1986-1990

- INPUT estimates that the federal government telecommunications market will increase from \$2.6 billion in FY85 to \$3.9 billion in FY90 with an average annual growth rate of 8.0%.
- This estimate reflects both a higher base (1985) market value and a lower growth rate than previously forecasted.
 - Many federal agencies reacted quickly in FY85 to the effects of the AT&T divestiture by acquiring networks and telephone systems in anticipation of future cost increases and mission requirements.
 - Budget pressures, including those mandated through the Gramm-Rudman-Hollings Act, will constrain future procurements.
- Although most federal telecommunications procurement remains concentrated in network services, other market segments show significant growth trends.
 - Replacement and lease-to-purchase conversion of existing communications hardware will spur capital investment through FY88.
 - Professional services, although representing a small part of the market, will exhibit the most consistent growth with an AAGR of 11%, primarily to cover maintenance requirements for communications systems purchased in FY85, FY86, and FY87.



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**FEDERAL TELECOMMUNICATIONS
MARKET FORECAST, GFY 1985-1990**

Note: Dollars are rounded to the nearest \$100 million.



D. TECHNICAL TRENDS

- With the variety of emerging telecommunications technologies, most federal agencies have adopted a "wait and see" attitude, preferring to see network service vendors assume the risks associated with new technology. Defense and other agencies with geographically-dispersed or campus-type facilities are moving more rapidly to implement satellite, digital microwave, fiber optic, and teleconferencing facilities.
- Although voice/data integration appears to be the catch-phrase for new federal telecommunications initiatives, integration will be limited to circuit and switching hardware capabilities. Integrated workstations will come into general use only in the late 1980s or early 1990s.
- Providing interconnection and, more importantly, interoperability for the diverse existing federal hardware inventory will be a continuing technical challenge.
- The federal government will continue its migration toward full adoption and enforcement of international standards, centered around the OSI reference model, to resolve interconnection problems.
- Federal agencies are growing more concerned with telecommunications security and requiring end-to-end encryption even for systems that handle nonsensitive information.



TECHNICAL TRENDS

- **Limited Acceptance of New Technology**
 - **Integration of Voice and Data Transmission**
 - **Interconnection and Interoperability Problems**
 - **Migration to International Standards**
 - **Emphasis on End-to-End Security**
-

E. ISSUES AND PROBLEMS

- Federal agencies and the private sector experienced similar types of problems entering the post-divestiture environment. The government encountered more and greater problems since it is the world's single largest customer for commercial telephone service.
- Agencies expressed growing concern over budget impacts of the Gramm-Rudman-Hollings Act. The impact on telecommunications programs may be mitigated, however, by cost tradeoffs between actual travel and "travel by telecommunications."
- Agencies were unprepared for the staffing impacts of divestiture and FIRMR-mandated integration of voice and data communications organizations. Agencies believe they cannot compete with the private sector to recruit scarce, highly-qualified telecommunications specialists.
- Telecommunications standards, except those inherited from the Bell system, vary from agency to agency. Although NBS and NCS have promulgated some joint standards, many agencies are waiting for more comprehensive industry consensus.
- Agency telecommunications planners, almost without exception, expressed reservations about GSA's understanding of their requirements and ability to acquire and implement the new telecommunications services planned for FTS 2000.



AGENCY PROBLEMS AND ISSUES

- **Post-Divestiture Service Problems**
 - **Budget Constraints (Gramm-Rudman-Hollings)**
 - **Reorganization and Shortage of Staff**
 - **Few Generally Established Standards**
 - **Lack of Confidence in GSA Programs (FTS 2000)**
-



F. LEADING AGENCIES

- Although all federal agencies buy some commercial telecommunications systems and services directly, annual procurement by DoD and GSA exceeds that of the other agencies combined.
 - The Defense Commercial Communications Office FY86 budget for commercial services stands at \$1.18 billion and has been growing between 12-15% a year.
 - The GSA information technology budget for FY86 includes over \$728 million for leased telecommunications.
- The major new telecommunications initiatives from FY86 through FY90 also come from DoD and GSA.
 - Defense communications will evolve from existing facilities such as AUTOVON and AUTODIN to the new Defense Switched Network (DSN).
 - GSA is pursuing a nearly complete replacement of current telecommunications resources through the POTS, ASP, WITS, and FTS 2000 programs.
- Of the major network programs initiated by individual civilian agencies, several have been awarded and the remainder are in questionable status.
 - Treasury, Interior, Energy, and Agriculture have awarded long-term network service contracts.
 - APRs from other agencies have been held by GSA pending determination of the suitability of FTS 2000 for meeting agency requirements.



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LEADING AGENCY TELECOMMUNICATIONS BUYERS

- **FY 1986 Leaders: Defense \$1.18 Billion/
GSA \$728 Million**
 - **Defense and GSA also Lead in Initiatives:**
 - **Defense Switched Network (DSN)**
 - **GSA ASP, WITS, and FTS 2000**
 - **Civilian Departmental Networks in Place
or Delayed**
-



G. VENDOR COMPETITIVE OUTLOOK

- Despite divestiture and increased market pressure, AT&T remains the dominant market force. In addition to protecting its existing market share, AT&T has been successful as a team member in several recent new network procurements.
- Aside from the provision of local voice service, the RBOCs will not be a significant force in the federal market during the next several years. The continued constraints of structural separation in most cases will prevent the RBOCs from bidding major federal procurements which require both basic and enhanced services.
- Several telecommunications companies from outside the old Bell organization, especially those which provide switching equipment and specialized network services, have shown increasing success in the federal market.
- With the exception of its Rolm subsidiary, IBM has not been a major market force in federal telecommunications. Acquisitions and apparent alliances over the past two years place the company in position to make a stronger, broader-based entry in the market.
- The window of opportunity for smaller telecommunications companies will close much more quickly than it did for their counterparts in ADP systems and services. The single supplier approach dictated for FTS 2000 and the increasing preference shown by federal agencies for a systems integration approach will lock out smaller vendors who do not have close ties to established prime vendors in the federal information systems and services market.



COMPETITIVE OUTLOOK

- **AT&T Remains Dominant**
 - **Questionable Federal Future for RBOCs**
 - **Non-Bell Companies in Some Market Segments**
 - **Threat of Stronger IBM Market Entry**
 - **Shake-Out on the Horizon**
-

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H. RECOMMENDATIONS

- All telecommunications vendors need to invest more effort in understanding agency missions and communications requirements. This understanding may be difficult to achieve, yet will be a key factor in successful bids for agency-wide telecommunications systems that support more than one mission.
- Since the government continues to experience a shortage of telecommunications expertise, vendors can improve their pre-bid position by providing education, technology forecasts, and planning guidelines through high-level briefings and meetings with federal officials.
- Vendors need to provide total telecommunications solutions, including pre-implementation planning and continued service. Agency officials frequently voiced concern over vendors, particularly in the hardware area, who provided inadequate support after installation. As a result, federal buyers are placing increased emphasis on corporate stability and reputation for service.
- Vendors must move quickly to establish a viable market presence in federal telecommunications. Recent rapid market growth, primarily in reaction to the AT&T divestiture, will not continue through the remainder of the 1980s, and networks and hardware acquired during FY85 and FY86 are not likely to be replaced before the 1990s.



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RECOMMENDATIONS

- **Understand Agency Missions and Communications Requirements**
 - **Provide Education and Assistance to Potential Buyers**
 - **Emphasize Total Solution, Corporate Stability, and Service**
 - **Move Quickly to Establish Market Position and Share**
-









III MARKET ANALYSIS AND FORECAST

- INPUT believes that federal telecommunications will show sustained growth throughout the 1980s and well into the 1990s.
 - Although the market will grow in terms of spending, the number of distinct opportunities will decrease.
 - Growth in some segments of the market will level off before 1990 but will be offset by new growth in other market segments.
- This section of the report presents INPUT's forecast for growth of the federal telecommunications market with supporting analysis of individual market segments, the competitive environment, and the potential effects of federal policy and regulation during the forecast period.

A. MARKET IMPACTS THROUGH 1990

- The growth of the federal telecommunications market through 1990 will be determined through the interaction of five major factors listed in Exhibit III-1. The first two factors are of particular importance to an understanding of the market.



EXHIBIT III-1

MAJOR FEDERAL TELECOMMUNICATIONS MARKET IMPACTS

- Budget and Deficit Reduction
- Policy and Regulation
- Agency Requirements and Buying Trends
- Technological Advances
- Vendor Competition



- Despite passage of the Gramm-Rudman-Hollings Act, INPUT believes that the effect of budget constraints will be mitigated in the federal telecommunications market segment.
 - Budget reductions actually may increase federal dependence on telecommunications services. Teleconferencing and electronic message distribution will be emphasized to reduce travel and other costs.
 - Current agency network service contracts typically are of long duration (7 to 10 years) and will not be terminated due to budget constraints. New and replacement network acquisitions, however, may be deferred if agencies can meet their telecommunications requirements through existing federal resources.
 - The higher-than-average level of capital investment in telecommunications equipment during the past few years will be reduced as agencies shift from straight purchase to lease-to-purchase or lease-to-ownership acquisition strategies. Capital investment will be spread over several years and in many instances will be funded through operation and maintenance budgets.
- As of FY86, two years after the AT&T divestiture agreement became effective, federal agencies are still reacting to the effects of divestiture.
 - Procurement practices and telecommunications plans are being adapted to the deregulated market in a piecemeal fashion.
 - The relatively new market environment created by the AT&T divestiture has attracted sharp public and industry scrutiny.
 - Due to the provisions of the Competition in Contracting Act (CICA), both congressional and executive oversight organizations will exert



considerable pressure to ensure full and open competition for federal telecommunications acquisitions.

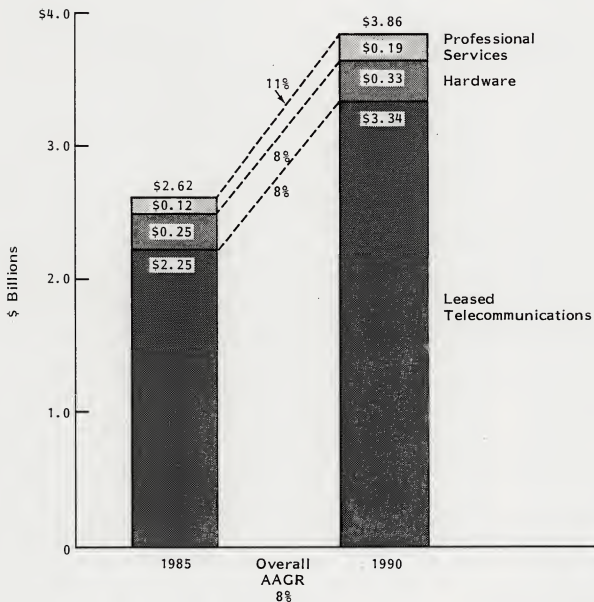
- Additional details regarding agency requirements, technological advances, and vendor competition are provided in following sections of this forecast and in Chapters IV and V of this report.

B. FORECAST OF SYSTEMS AND SERVICES

- INPUT estimates that the federal telecommunications market will grow from \$2.6 billion in FY85 to nearly \$3.9 billion in FY90 at an overall average annual growth rate (AAGR) of 8%, as shown in Exhibit III-2.
- This market forecast combines several of the commercially defined systems and service modes described in Appendix B.
 - Telecommunications.
 - . Networks.
 - . Transmission facilities.
 - Hardware.
 - . Communications devices.
 - . Computer systems.
 - Professional services.
 - . Consulting.
 - . Education and training.

EXHIBIT III-2

FEDERAL TELECOMMUNICATIONS MARKET, 1985-1990



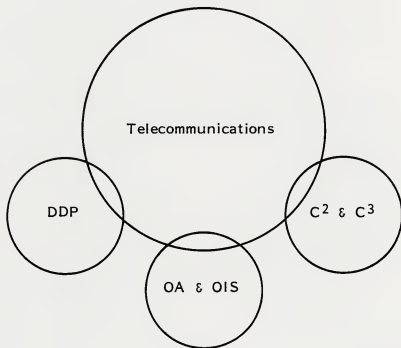
Note: Dollars are rounded to the nearest \$10 million.



- Programming and analysis.
 - Operation and maintenance.
 - Systems integration.
- In addition, the forecast includes the integral communications components of hardware systems and professional services that support office systems, distributed data processing (DDP), and C² and C³ programs. As depicted in Exhibit III-3, INPUT included a percentage of the funding for these programs based on detailed analysis of the individual program telecommunications requirements.
- The FY85 base of \$2.6 billion is higher than the forecast previously published in the June 1985 INPUT Procurement Analysis Report (PAR).
 - The PAR forecast was based on the FY85 federal information technology budget available to INPUT in mid-April 1985. When the FY86 information technology budget was released, it indicated a substantial increase of FY85 actual expenditures above the budget, from \$13.2 billion to \$14.6 billion, with much of the increase appearing in telecommunications and programming and analysis.
 - The original agency estimates for FY85 telecommunications expenditures did not foresee several changes in the market:
 - Increased local service costs attributable to the AT&T divestiture.
 - Early recognition by some agencies of the impact of divestiture on future networks, which led to corresponding early Agency Procurement Requests (APRs) to GSA for Delegation of Procurement Authority (DPA) to contract for replacement networks.

EXHIBIT III-3

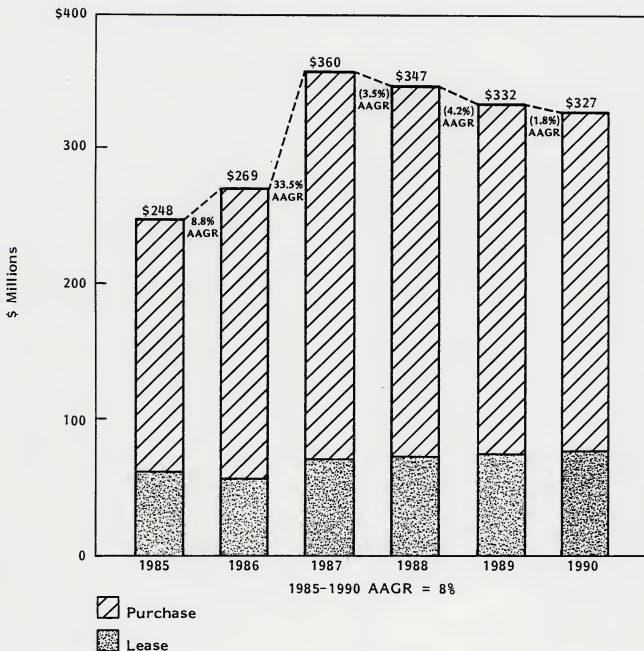
FEDERAL TELECOMMUNICATIONS-RELATED MARKET SEGMENTS



- Rapid agency response to the deregulation of customer premises equipment (CPE), resulting in increased federal purchase of telephone and switching equipment, much of which replaced CENTREX service.
- The large percentage of the market forecast of leased telecommunications services in Exhibit III-2 (87%) tends to obscure some important trends in the smaller segments.
 - Despite an average growth rate near that of the overall federal telecommunications market, the hardware segment exhibits the greatest year-to-year fluctuation, as noted below.
 - The professional services segment, although the smallest of the three, exhibits the strongest, most consistent growth throughout the forecast period, also discussed below.
- As shown in Exhibit III-4, INPUT expects the hardware segment of the federal telecommunications market to grow rapidly through FY87, then decline.
 - Increased capital investment in FY85 through FY87 is attributable largely to agency digital PBX acquisitions. These systems have been acquired based on a ten-year system life and will not be replaced until sometime after 1990.
 - Since agencies are now buying PBX equipment in anticipation of new requirements, upgrades and expansions in the later years will not be of sufficient magnitude to maintain the growth rate.
 - The amount of telecommunications equipment required by the federal government is largely a function of the size of the government staff. Budget deficit constraints of FY87 through FY90 are likely to limit or

EXHIBIT III-4

FEDERAL TELECOMMUNICATIONS HARDWARE MARKET FORECAST



Note: Dollars are rounded to the nearest \$ million.



reduce federal staffing levels and further depress the telecommunications hardware market.

- Budget constraints also may force agencies to spread capital investment into the FY88 to FY90 timeframe. Agency use of lease-to-purchase or lease-to-ownership (LTOP) procurements would smooth the forecast and result in higher out-year expenditures.
- The ratio of purchased to leased equipment expenditures through the forecast reflects both departmental directives and agency preferences.
- INPUT estimates that the professional services segment of the federal telecommunications market will grow from \$120 million in FY85 to \$194 million in FY90 at an AAGR of nearly 11%, higher than the overall telecommunications growth rate. As shown in Exhibit III-5, year-to-year growth rates for professional services fluctuate somewhat but display no decline throughout the forecast.
 - The combined effect of budget constraints on agency staffing and the shortage of in-house telecommunications expertise is expected to contribute to the growth of professional services throughout the forecast period.
 - Growth in the FY88 through FY90 timeframe also will be driven by agency acquisition of maintenance services for the hardware purchased earlier in the forecast period.

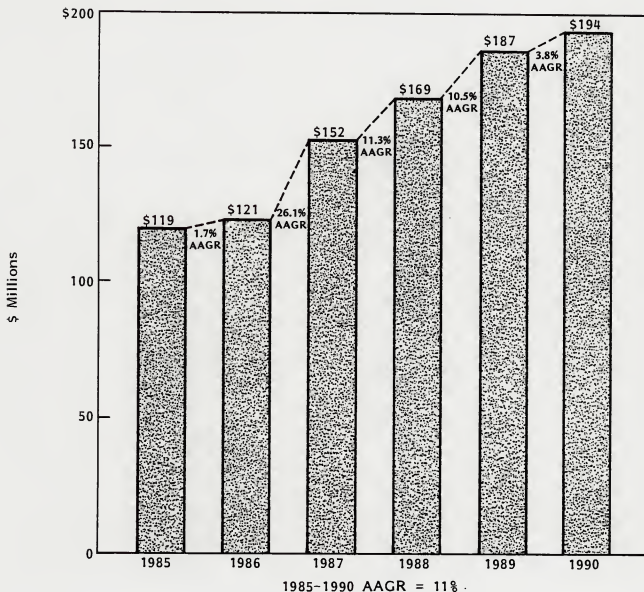
C. AGENCY FORECAST

- The federal telecommunications market forecast by agency is based on information from long-range plans, OMB A-11 submissions, the FY86 budget



EXHIBIT III-5

FEDERAL TELECOMMUNICATIONS PROFESSIONAL SERVICES
MARKET FORECAST



Note: Dollars are rounded to the nearest \$ million.

of the United States, and interviews with agency officials responsible for telecommunications programs.

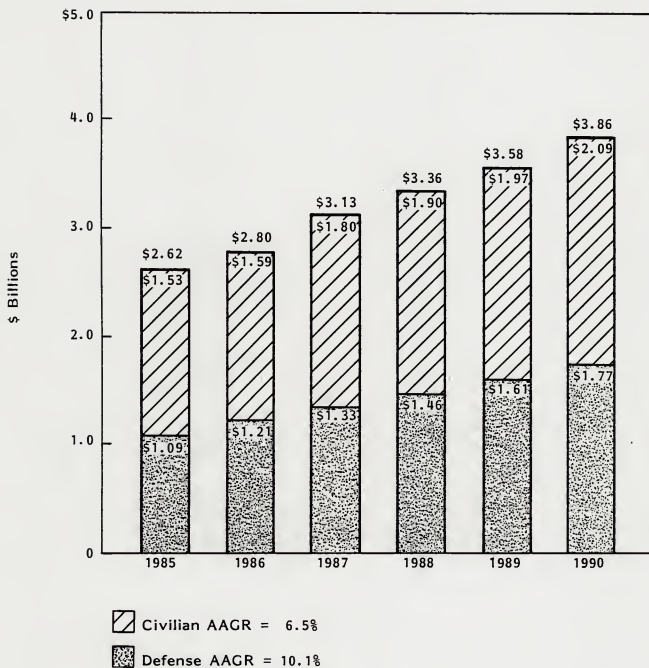
- As shown in Exhibit III-6, INPUT estimates a higher rate of growth in defense than in the civilian agencies, with the defense forecast growing from \$1.1 billion in FY85 to nearly \$1.8 billion in FY90. The civilian forecast estimates growth from \$1.5 billion to \$2.1 billion over the same time period.

I. SPECIAL DEFENSE CONSIDERATIONS

- INPUT regards the defense telecommunications forecast as a conservative estimate of the defense market for commercial systems and services.
 - Base or facility communications which are not acquired through agency-wide programs usually are not identified in agency information technology budget documents. This is particularly evident for recent telephone switching equipment and local service acquisitions at military bases.
 - Upgrades to base communications systems and local telephone service typically fall below budget reporting thresholds and may be funded through operation and maintenance budgets.
- Additional information is likely to become available in FY87 for increased out-year program funding. In 1985 the House Defense Appropriations Subcommittee extended oversight of defense information technology programs when it instructed the Army and the Air Force to increase the level of detail in their OMB A-11 budget submissions.
 - All unclassified programs with a system life cycle cost of over \$25 million will be reported. This new reporting limit represents a significant change. By comparison, it equals the previous one-year limit set for MAISRC review.

EXHIBIT III-6

FEDERAL TELECOMMUNICATIONS MARKET FORECAST DEFENSE AND CIVILIAN



Note: Dollars are rounded to the nearest \$ million.

- The subcommittee found less fault with the Navy and suggested that the Army and Air Force follow the level of detail of the Navy A-11 as an example.
- A significant amount of defense communications equipment funding is included in weapons programs and strategic systems. This funding is not regarded by DoD as part of the information technology budget. Other sources provide a general picture of the magnitude of the defense communications market:
 - The defense budget for intelligence and communications missions is expected to exceed \$33 billion in FY88 and has been growing since 1984 at an AAGR of 14.3%.
 - The FY86 defense budget includes over \$8.2 billion for communications and electronics equipment.
 - The FY86 defense appropriation for DCA includes \$10.8 million for acquisition of hardware in support of the Defense Switched Network (DSN). The corresponding A-11 submission from DCA did not include this program.

2. LEASED TELECOMMUNICATIONS PROCUREMENT

- Exhibit III-7 shows the current and forecast distribution of leased telecommunications service procurement by agency for major defense and civilian buyers. Several assumptions about the forecast must be noted for interpretation.
 - Both the Army and the Navy rank in the top 10 users of FTS as measured by interagency payments. For this forecast, however, all FTS expenditures are included in the civilian numbers since GSA ultimately acquires the commercial services to support FTS.

EXHIBIT III-7

LEASED TELECOMMUNICATIONS SERVICE PROCUREMENT BY AGENCY

DEPARTMENT / AGENCY	\$ Millions	
	FISCAL YEAR 1986	FISCAL YEAR 1990
<u>Defense</u>		
Air Force	655	1,030
Army	210	307
Navy	209	255
<u>Civilian</u>		
GSA	729	822
Energy	84	123
Agriculture	55	114
HHS	52	76
NASA	50	73
VA	48	71
Commerce	36	62
FEMA	23	23
Interior	23	27
Justice	22	24
Treasury	18	173



- The GSA forecast assumes replacement of FTS with FTS 2000 beginning in FY87 at an annual operating cost of approximately \$420 million.
- The Air Force forecast assumes that the service retains its status as executive agent for systems such as AUTOVON and AUTODIN/DDN. In the event that DSN is implemented before 1990 under DCA funding, the Air Force forecast would be reduced significantly.
- The large increase shown in the Treasury forecast reflects increased telecommunications use by IRS in support of the tax system redesign and electronic tax processing initiatives.
- While individual agencies may acquire new telecommunications services during the forecast period, new and replacement network acquisitions by defense and GSA are most prominent:
 - Defense Switched Network.
 - FTS 2000.
 - Washington Interagency Telecommunications System (WITS) (GSA).
- The defense and GSA networks may be used to satisfy individual agency requirements and reduce direct spending by the agencies for commercial telecommunications service.

D. VENDOR MARKET SHARE AND COMPETITION

- Within the two years since the AT&T divestiture, the list of potential suppliers of telecommunications systems and services to the federal govern-

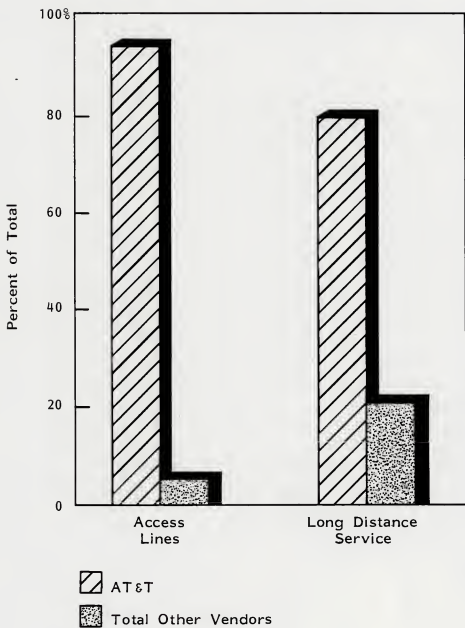
ment has grown to nearly 3,000 companies. INPUT believes that the number of suppliers will diminish from FY86 through FY90 under the pressure of intense competition for the federal dollar.

- Smaller companies, including most "start-ups," will be unable to maintain a prime federal market presence because the size and capital-intensive nature of federal telecommunications programs.
- Federal agencies will show increasing preference for working with larger, established federal vendors acting as prime contractors or systems engineering and technical assistance (SETA) contractors.
- AT&T is expected to retain its dominant position in the federal telecommunications market through 1990. AT&T's share of the current FTS service, as shown in Exhibit III-8, is indicative of the company's overall federal market presence.
- While holding a dominant position, AT&T remains vulnerable in several specific market segments.
 - Companies such as CONTEL, Rolm, and Northern Telecom will continue to make inroads in the hardware market segment.
 - Loss of existing business with GSA through the FTS 2000 competition could alter AT&T's market position significantly. In INPUT's opinion, however, AT&T will be one of the leading bidders for the FTS 2000 award.
 - AT&T will face increasing competition from the Bell Operating Companies (BOCs) where regulation and RFP requirements permit, particularly in the provision of local telephone systems.



EXHIBIT III-8

AT&T SHARE OF FTS SERVICE



- Despite the diversification and expansion efforts of the Regional Bell Operating Companies (RBOCs), their share of the federal telecommunications market will grow only slowly from 1986 through 1990 unless there are substantial changes in the regulatory climate.
- Systems houses, experienced in the federal marketplace, stand to gain most in the federal telecommunications market, in INPUT's opinion. The recent award of the U.S. Customs network to CSC, with BBN and AT&T, may be regarded as a prototype for other agency-wide network acquisitions.
- INPUT believes that traditional Value-Added Network (VAN) vendors will be hard-pressed to expand their share of the market from FY86 through FY90.
 - VAN vendors probably will retain existing market share due to the long-term nature of existing contracts.
 - The distinction between VAN and common carrier services is becoming blurred as traditional long-haul communications carriers add features previously available only from VANs.
 - Federal networks such as the Defense Commercial Telecommunications Network (DCTN), DSN, and FTS 2000 will offer services in direct competition with VANs.
- IBM's market entry as a major full-service telecommunications vendor is likely to coincide with GSA's FTS 2000 procurement. In this role, IBM will resemble the systems houses, acting as a federal telecommunications systems integrator. The respective roles of Rolm and MCI in the IBM federal market strategy cannot be predicted at this time.

E. TECHNOLOGICAL IMPACTS

- As shown in Exhibit III-9, agency and vendor telecommunications experts are in remarkable agreement about the types of new technologies which will affect federal telecommunications planning and acquisition in the 1986-1990 timeframe.
- Most of these emerging telecommunications technologies, specifically those perceived as most significant by vendors (ISDN and fiber optics), will be important in the federal market in the late 1980s and early 1990s.
- Agencies and vendors generally agree on the timetable for these technologies to be adopted by the federal government. The reasoning behind the agreement, however, is decidedly different.
 - Agencies want to avoid risk and stay a comfortable distance behind the leading edge of technology.
 - Vendors believe that all telecommunications technology is moving in advance of user requirements (federal and private sector), with the lag particularly evident in the federal sector due to longer system life cycles.
- Some federal agencies may be forced or choose to adopt new telecommunications technology earlier in the 1980s.
 - Agencies investing in supercomputer technology to meet high-volume data and computational requirements will encounter communications bottlenecks.
 - Agencies with dispersed facilities in remote areas cannot meet existing communications requirements through land wire carriers alone and have turned to satellite, radio, and microwave technologies.



EXHIBIT III-9

TECHNOLOGICAL IMPACTS ON FEDERAL TELECOMMUNICATIONS

EMERGING TECHNOLOGY	IMPORTANT TO:	
	AGENCY	VENDOR
ISDN	X	X
Fiber Optics	X	X
Satellite Networks	X	X
Virtual Networks		X
Software-Defined Networks	X	
Chip-level Protocol Implementation	X	X
Integrated Voice/Data/Video Transmission		X
Voice and Video Teleconferencing	X	
Digitized Voice		X
Voice Message Distribution	X	
LAN/PBX Hybrids		X
Workstation Processing	X	

Note: Table is ordered by number of times mentioned by vendors and agency officials.
Blank entry indicates no mention.



F. POLICY AND REGULATORY PROSPECTS

- The Federal Information Resource Management Regulations (FIRM) have been in effect for several years as the primary source of guidance for agency acquisition, management, and use of ADP and telecommunications systems. Actual merger of agency ADP and telecommunications functions has lagged and continues to be problematic.
 - Voice and data communications organizations have been merged in the OIRM only recently in most agencies. For the majority of agencies, consolidated voice and data communications plans will affect procurements at the earliest in FY87.
 - These recent organizational changes have created some confusion over responsibilities which will be resolved gradually through the 1980s. The previously separate voice and data communications organizations typically employ different approaches to communications problems and in some cases are in open opposition with regard to solutions.
 - Along with the organizational changes, budget planning and reporting are changing slowly to incorporate both voice and data communications program funding in general information technology budgets.
- DoD acquisition and management of telecommunications systems will come under increased scrutiny from OMB and Congress during FY86 and FY87.
 - The House Defense Appropriations Subcommittee has noted what it considers to be inadequate reporting and OSD review of information technology programs.
 - Both OMB and Congress seem skeptical about DoD use of the "mission critical" designation to exempt systems from reporting and review



under the Warner Amendment to the Paperwork Reduction Act (mini-Brooks bill).

- OMB also continues to question DoD commitment to full and open competition for telecommunications acquisitions.
- The OSD Office of the Comptroller will release two reports in FY86 which could have additional significant implications for the acquisition and management of defense telecommunications systems.
 - A report on management actions to institute policy for local-area networks.
 - A report on the collocation of data processing installations and telecommunications centers. This report will include the results of an Air Force pilot project said to have achieved significant cost savings through collocation of facilities.
- Notwithstanding the efforts of OMB, NBS, and NCS, comprehensive policy on federal telecommunications standards will not impact agency acquisitions until late in the 1980s.
 - Individual agencies may adopt standards in advance of government-wide policy.
 - Informal pressures to adopt OSI standards will increase throughout the 1980s.
- Congress is considering several bills, such as H.R. 3378--Electronic Communications Privacy Act--which could require agencies and vendors to provide end-to-end security and effective encryption for federal telecommunications systems.



- Like any other consumer, the federal government will be subject to regulatory actions taken as a result of the ongoing FCC Computer Inquiry III.
- Considering recent interpretations and court actions based on the Modified Final Judgement (MFJ), INPUT regards relaxation of the structural separation requirements in the near future as unlikely.
- Federal agencies must balance between such regulatory restrictions and competition in contracting requirements in the formulation of acquisition plans.
- Given the long-term uncertainties of the regulatory climate, agencies must be prepared to modify acquisition plans with little or no advance notice in response to regulatory or tariff changes.

G. SUMMARY AND CONCLUSIONS

- Even considering the projected slowdown in growth during the FY86 to FY90 timeframe, the federal telecommunications market presents significant opportunities for vendors.
 - Telecommunications programs appear to be less likely to be targets for budget reductions than other federal information technology programs.
 - The long system life cycles for federal telecommunications systems provide predictable, continuing revenue and potential for extension or expansion of contracts.
- The shortage of federal telecommunications expertise and constraints on hiring provide attractive opportunities for professional services vendors, particularly in two areas.



- System engineering and technical assistance (SETA) for new or replacement systems.
- Telecommunications hardware maintenance.
- The federal telecommunications market does present some substantial risks to balance against the opportunities.
 - Most funding is concentrated in a relatively few large network procurements.
 - Agencies have shown a preference, as exhibited in recent contract awards, for acquiring telecommunications service, directly or indirectly through systems houses, from larger, established carriers.
 - Budget constraints in other federal information technology market segments will foster competition for the more certain funding allocated to telecommunications programs.
- Prevalent agency perceptions of the post-divestiture telecommunications market could cause additional difficulties for vendors.
 - Since agencies meet telecommunications requirements primarily through the acquisition of services, the underlying technology, and any associated risk, should be borne by the vendor.
 - If agency requirements are satisfied through teaming or subcontracting, the prime contractor must assume sole responsibility for quality and availability of service, much as the Bell System did in the pre-divestiture environment.



- Agencies believe that telecommunications vendors have "over-built" in terms of capacity and that transmission costs will stabilize or decline during the 1980s.
- The success or failure and timing of major telecommunications initiatives such as DSN and FTS 2000 could radically alter the number and size of opportunities in the market.
 - Most existing defense telecommunications requirements could be satisfied through DDN and DSN in the early 1990s.
 - If all planned FTS 2000 options were exercised, the system would provide services ranging from simple two-wire voice to VAN (packet-switched data) to dedicated digital circuits (T1).







IV AGENCY REQUIREMENTS

- As part of its research effort, INPUT interviewed federal officials responsible for agency telecommunications policy, planning, acquisition, management, and use.
- INPUT also contacted federal officials in agencies responsible for government-wide regulation, standards, and policy.
- The views of these agencies, as listed in Exhibit IV-1, and the requirements of major user agencies are presented in following sections of this report.

A. KEY PLAYERS IN REGULATIONS, STANDARDS, AND POLICY

- Although the agencies described below are not major telecommunications users, their activities help to mold individual user agency telecommunications policy and plans.
- I. FEDERAL COMMUNICATIONS COMMISSION
- The Federal Communications Commission (FCC) was established by the Federal Communications Act of 1934. Its mission includes regulation of interstate and international communications, scientific and technical support, and long-range policy and analysis.

EXHIBIT IV-1

PRIMARY AGENCY ROLES IN FEDERAL TELECOMMUNICATIONS

REGULATION, STANDARDS, AND POLICY

Federal Communications Commission (FCC)

National Telecommunications and Information Administration (NTIA)

National Communications System (NCS)

National Bureau of Standards (NBS)

National Security Agency (NSA)

Office of Management and Budget (OMB)

MAJOR BUYERS

Defense (Defense Communications Agency, Defense Commercial Communications Office)

GSA

MAJOR USERS

Air Force

Army

Navy

Energy

Agriculture

Health and Human Services

Veterans Administration

NASA

Commerce



- Of more importance to agency telecommunications requirements is the relationship between the FCC and two other agencies.
 - The FCC and the National Telecommunications and Information Administration (NTIA) jointly manage radio frequency assignment. NTIA has responsibility for federal radio frequencies and the FCC handles the private sector.
 - In times of national emergency, many of the responsibilities of the FCC transfer to the National Communications System (NCS).
- The FCC affects the future of the federal telecommunications market primarily through two activities:
 - The continuing examination (Computer Inquiry III) of deregulation and of the effects and conditions of the AT&T divestiture.
 - Participation in CCITT study groups to define ISDN standards.

2. NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION

- The National Telecommunications and Information Administration (NTIA) was established as part of the Commerce Department in 1978 through a reorganization of the Office of Telecommunications Policy in the Executive Office of the President and Commerce's existing Office of Telecommunications. NTIA is one of the President's principal advisors on telecommunications and information issues and provides assistance to other federal agencies in the areas of telecommunications planning, design, maintenance, and improvement.
- By the admission of NTIA officials, the role of NTIA in setting federal telecommunications policy has been diminished somewhat in recent years.



NTIA receives most of its sponsorship from DoD and in particular the Army, DCA, and NCS.

- Recent and current NTIA activities include:
 - Development of a minicomputer monitoring and control system for DCA's Digital European Backbone Network.
 - Ongoing cooperative work with NCS to develop federal modem and data encryption standards, including FED-STDs equivalent to the CCITT V.22bis, V.26, V.26bis, and V.32 standards and FED-STDs 1028 and 1029 for the application of DES to facsimile and digitized voice transmission.
 - Development of measurement plans and test equipment for the Army's Experimental Integrated Switched Network at Fort Monmouth, NJ, a prototype for the Defense Switched Network.
 - Like the FCC, NTIA is participating in CCITT study groups to define ISDN standards.

3. NATIONAL COMMUNICATIONS SYSTEM

- The National Communications System (NCS) and the Federal Telecommunications Standards Program were established in 1972. In addition to its aforementioned national emergency role in telecommunications, NCS develops the Federal Telecommunications Standards (FED-STDs) which are issued subsequently by GSA.
- The ongoing NCS standards activities focus on two areas of concern to federal agencies.
 - Interoperability of computer and communications systems.



- Development of ISDN standards with CCITT. Over 40% of available NCS manpower in the standards area is committed to this effort.

4. NATIONAL BUREAU OF STANDARDS

- The National Bureau of Standards (NBS) as part of the Department of Commerce develops and issues the Federal Information Processing Standards (FIPS) under the provisions of Public Law 89-306 (Brooks Act). Much of the actual development of the FIPS is done by the Institute for Computer Sciences and Technology (ICST) at NBS.
- In response to the merging of communications and computer technology, standards development at NBS has increasingly involved joint efforts with NCS, such as the federal X.25 standard (FIPS 100, FED-STD 1041). NBS also works with DoD to develop MIL SPEC equivalents to the FIPS.
- NBS has been concentrating on the development of federal standards which are compatible with CCITT OSI recommendations. Despite a clear preference on the part of NBS officials for OSI standards, NBS cannot mandate federal agency compliance. Federal policy in such matters must be set by OMB and enforced by GSA.
- NBS sponsors a number of vendor programs to promote commercial development and implementation of OSI-compatible systems.
 - OSI implementors workshops.
 - MAP/TOP demonstrations which use communications protocols based on OSI standards (FIPS 107, IEEE 802.2 and 802.3).
 - OSINET, a packet-switched network for development and testing of OSI products which has been in development for several years and is scheduled to go on-line in CY86.



- In February 1986, NBS began work with DCA to define OSI standards for DoD. The timeframe for implementation of these standards is not fixed. NBS estimates at least a five-year effort to transition from current DoD standards, such as TCP/IP, to OSI.

5. NATIONAL SECURITY AGENCY

- Under National Security Directive 145, the National Security Agency (NSA) assumed responsibility for government-wide communications security. Specific information about NSA activities is available only to cleared individuals and corporations.
- NSA continues to seek vendor cooperation in the application of government cryptographic methods to commercial systems through the Commercial Comsec Endorsement Program.
- NSA programs to certify trusted computer systems will influence the development of DoD communications systems such as DSN. DoD plans include the use of trusted software in programmable communications equipment such as digital switches.

6. OFFICE OF MANAGEMENT AND BUDGET

- The Office of Management and Budget (OMB) has taken a very active interest in the regulatory aspects of the telecommunications market and in federal agency plans for telecommunications systems. INPUT interviewed OMB officials in both the Office of Regulatory Affairs and the Telecommunications Division.
- At one time OMB was perceived as being strictly opposed to GSA's FTS 2000 initiative. That stance has softened somewhat, but OMB still questions some of the assumptions and projected benefits of the initiative.



- GSA has not proven to OMB's satisfaction that FTS 2000 provides the most economical solution to the government's telecommunications needs.
- The economies of scale claimed for FTS 2000 may not be realized by individual agencies. Bundled procurement may force agencies to accept and pay for services or features they neither need nor want.
- With FTS and the proposed FTS 2000, the dual roles of GSA open the potential for conflict of interest. GSA acquires telecommunications service subject to the FIRMR. GSA also regulates such acquisition through the issuance and administration of the FIRMR.
- In light of its continuing evaluation of FTS 2000, OMB believes that agency telecommunications managers should develop contingency plans for meeting agency requirements through direct acquisition of services.
- OMB has increased its monitoring for sole-source telecommunications procurements, some of which may be represented by the agencies as continuation of existing (pre-divestiture) contracts. OMB foresees potential legal problems for the government if such procurements are permitted in a newly competitive market which is subject to CICA and to public scrutiny.

B. AGENCY PLANS

- In the course of the research effort for this report, INPUT concentrated its interview efforts on two groups of agencies.
- Leading users of leased telecommunications services as reflected in the agency FY86 A-11 submissions to OMB. A list of these agencies is shown in Exhibit IV-2.

EXHIBIT IV-2

LEADING LEASED TELECOMMUNICATIONS USERS

DEPARTMENT / AGENCY	FY 86 A-11 (\$ Thousands)
<u>Defense</u>	
Air Force	\$654,502
Army	209,975
Navy	209,449
AFIS	20,041
JCOS	16,882
USMC	14,716
<u>Civilian</u>	
GSA	\$728,540
Energy	84,303
Agriculture	55,111
HHS	51,949
VA	48,442
NASA	49,835
Commerce	35,792
FEMA	23,483
Interior	22,801
Justice	22,107
Treasury	18,172
Transportation	14,142



- Agencies represented on the GSA OIRM Interagency Telecommunications Committee and the WITS Implementation Committee.
- The following sections of this report highlight specific major agency plans for new or expanded telecommunications systems and services and summarize agency requirements. Individual telecommunications programs are listed by agency in Chapter VI of this report.

I. DEFENSE

- The majority of defense voice and data communications requirements have been satisfied in the past by the Defense Data Network (DDN), AUTOVON, AUTODIN, and GSA's FTS.
 - The Air Force acts as DoD Executive Agent for AUTOVON.
 - The Army and the Navy rank in the top 10 users of FTS.
- The Defense Communications Agency has initiated a major program, the Defense Switched Network (DSN), for defense-wide integration and replacement of existing network facilities. The FY86 defense appropriation includes \$10.8 million for DSN hardware acquisition. Full-scale implementation and transition, however, will not occur until the early 1990s.
 - DSN meets increasing DoD requirements for voice, secure voice, data, integrated voice/data, video, and conferencing telecommunications services.
 - DSN applies both artificial intelligence and trusted software written in Ada to switching and network control systems.



- DSN may use a variety of transmission facilities, as listed in Exhibit IV-3.
 - DSN will be patterned on ISDN concepts using commercially-compatible DoD higher-level protocols.
 - End-to-end security will be provided through both secure telephone units (STU-II and STU-III) and multilevel data security.
 - Unlike AUTOVON and AUTODIN, DDN will be integrated with DSN in the early 1990s. Exhibit IV-4 shows the projected transition.
- In addition to DSN, individual services are replacing most base telephone systems. Specific funding and schedules for these acquisitions generally are not identified in agency planning and budget documents.
- Switches are being acquired in small quantities.
 - The size of most procurements falls below DoD A-11 reporting thresholds.
 - Funding is being provided through O&M budgets.

2. GSA

- GSA is the largest federal buyer and internal supplier of telecommunications service. Major existing and planned GSA telecommunications programs are listed in Exhibit IV-5.
- The POTS procurements, to replace standard telephone line sets and key systems in federal agencies, will be completed in FY86 and are all now at least past RFP release. The remaining three programs are described in detail in the INPUT Procurement Analysis Reports and are presented briefly below.



EXHIBIT IV-3

DSN TRANSMISSION FACILITIES

- Satellite
- HF (300 km)
- Meteor Burst (1,500 km)
- Microwave Line-of-Sight (LOS)
- Millimeter Wave LOS
- Troposcatter (300 km)
- Fiber Optic Cable
- Metallic Cable

Source: DCA: Defense Communications System in the year 2000.

EXHIBIT IV-4

CHANGES IN THE DEFENSE COMMUNICATIONS SYSTEM

1985	POST-1990
<ul style="list-style-type: none">• 71 Nodal Switches in AUTOVON• 15 Autodim Switches• 110 DDN Nodes	<ul style="list-style-type: none">• Over 160 Nodal Switches in DSN• Over 90 I-S/A AMPE Terminals• Over 500 DDN Nodes

Source: DCA: Defense Communications System in the year 2000.



EXHIBIT IV-5

GSA TELECOMMUNICATIONS PROGRAMS

CURRENT

- Federal Telecommunications System (FTS)
- Federal Secure Telecommunications System (FSTS)
- Circuit Procurement

NEW/PLANNED

- Purchase of Telephone Systems (POTS)
- Aggregated Switch Procurement (ASP)
- Washington Interagency Telecommunications System (WITS)
- FTS 2000



- The ASP program provides for a single acquisition of switching equipment in each GSA region to serve all federal agencies.
 - The ASP program was established in response to early post-divestiture GSA experience with individual switch procurements. These earlier procurements provided no acquisition-to-acquisition learning curve improvements, with the same basic requirements and procedures being developed separately for each acquisition.
 - The first ASP procurement for GSA Region I has been completed and will be used as a prototype for future procurements.
 - Two additional ASP regional procurements are scheduled during FY86.
- The FTS 2000 program provides for the replacement of FTS through a single contract with a prime services vendor. In contrast to the past GSA circuit acquisition strategy, GSA has devised the FTS 2000 procurement strictly as a services acquisition. GSA estimates the contract value of these services at between \$400 and \$450 million a year. GSA will neither lease circuits nor purchase telecommunications hardware or facilities in support of FTS 2000.
 - FTS 2000 is understood in several different ways, even within GSA.
 - An intercity network.
 - An intercity network including switching equipment.
 - All federal telecommunication services provided by GSA.
 - Confusion over these interpretations persists inside and outside the government.



- Based on the draft FTS 2000 RFP released by GSA in September 1985, the mandatory requirements specify only replacement of existing FTS services.
- The mandatory optional and optional requirements request much more extensive service, including ISDN features, packet switching, T1 circuits, and DES encryption.
- Although the term of the FTS 2000 contract extends over 10 years, the contractor is given no guarantee of system usage after the first three years. This schedule conforms with the length of FTS 2000 subscription agreements to be executed between GSA and individual agencies.
- The schedule for FTS 2000 RFP release has slipped at least six months due to the level of industry and agency comment on the September 1985 draft. A second draft will be released for comment later in 1986. Although GSA has not commented formally, other program milestones are likely to slip correspondingly, extending full implementation well into the 1990s.
- The WITS program is similar in concept to FTS 2000 but targeted for the special requirements of the Washington, D.C. metropolitan area. The basic thrust of the WITS program is replacement of existing federal service in the capital, now primarily CENTREX, with an integrated voice/data network.
- Although a draft WITS RFP has not been released, the program office stated that the services requested will be equivalent to those for FTS 2000.
- The WITS program schedule has been timed to coincide with that of FTS 2000. It is not clear whether WITS will proceed in lock-step with FTS 2000 and suffer additional schedule slippage.

- In contrast to FTS 2000, WITS includes some replacement and upgrade of telecommunications facilities and cabling currently managed by GSA for individual agencies on a shared-use basis.
- The original WITS committee report recommended inclusion of DoD facilities within the acquisition and implementation of the Washington area system. To date, DoD has not cooperated in the WITS effort and apparently will acquire Washington local service outside the scope of the WITS program.

3. DEPARTMENT OF ENERGY

- The Department of Energy (DOE), in addition to being one of the largest civilian users of commercial telecommunications service, relies heavily on contractor support to meet telecommunications requirements, including planning, implementation, operation, and maintenance.
- By agreement with GSA, DOE has acquired a backbone communications network (OPMODEL) linking its facilities primarily through satellite circuits. The current contract includes options to expand the OPMODEL network to 24 fixed and one mobile ground station. Considerable expansion is indicated in the DOE A-11 budget submission.
- Although department-wide telecommunications services are planned and acquired centrally, individual facilities retain the responsibility for local and on-campus communications.
- DOE recently acquired the telecommunications systems for its two Washington Headquarters locations. DOE is evaluating the acquisition of T1 circuits to link these locations and as tail-segments for the OPMODEL network.



4. DEPARTMENT OF AGRICULTURE

- With few exceptions, Department of Agriculture's (USDA) data communications requirements have been met through a 1982 contract for value added network service (DEPNET). If USDA exercises all options on the current contract, recompetition will not occur until FY89.
- Although the OIRM retains department-wide telecommunications policy and planning authority, local telecommunications services and equipment are being upgraded through decentralized procurement at 16,000 USDA field offices.
- USDA has planned its own Washington area telecommunications system (AWATS). AWATS, if fully implemented, would connect 18,000 lines in 200 buildings at 12 separate locations in the Washington, D.C. metropolitan area. Phase I of AWATS, linking the main four building complexes through a local-area network, is nearing completion. Subsequent project phases have been placed on hold pending departmental review.

5. VETERANS ADMINISTRATION

- The Veterans Administration (VA) assumed responsibility for the GSA Advanced Record System (ARS) in January 1984. This system, now called the Veterans Administration Data Transmission System (VADATS), links over 250 VA sites through a value-added packet-switched network.
- VADATS has been enhanced continuously since 1984, but will be replaced with an integrated data communications utility. RFP release for the VADATS replacement is scheduled in FY86 with contract award anticipated in FY87.
- Individual VA facilities are responsible for local telecommunications service and equipment. These facilities have been acquiring new switching equipment at a rate of between 20-25 sites per year.

- The VA is enthusiastic about FTS 2000 and will use the system for voice communications and some data communications should FTS 2000 prove to be more economical than commercially-leased services.

6. NASA

- NASA telecommunications programs are divided functionally between two program managers.
 - Space systems, including telemetry, launch, and landing systems.
 - "Traditional" telecommunications, including local and long distance, voice, and data services.
- NASA has acquired contractor services to support its traditional telecommunications requirements for both voice and data. FTS 2000 will be considered for communications outside the NASA network.
- Although telecommunications planning and funding are centrally controlled, each NASA center retains responsibility for providing its own local telecommunications service. By the end of CY86, all major NASA facilities will have acquired digital switches.

7. SUMMARY OF AGENCY PLANS

- With only a few exceptions, agencies have centralized planning and acquisition of telecommunications services within the OIRM. Although separate voice and data communications offices exist in approximately 50% of the agencies, integration of these offices is imminent.
- Agencies which have contracted for department-wide networks rely on the network service contractor for network control. A majority of the other



agencies contacted by INPUT have network control centers for all or selected portions of their telecommunications systems. Several of these network control centers, notably those in NASA and TVA, are contractor operated. Specific future network control center requirements are listed in Exhibit IV-6.

- DoD organizations operate under a "buy-not-lease" directive and have little choice in terms of acquisition methods. As shown in Exhibit IV-7, purchase is the preferred method for acquisition of telecommunications hardware and software as well. Most agencies that preferred to purchase telecommunications systems noted lease-to-purchase or lease-to-ownership as viable options, especially if budget constraints forced them to defer capital investment.
- Agencies plan to meet their telecommunications requirements in a variety of ways, as shown in Exhibit IV-8.
 - Many agencies, as exemplified by the detailed agency plan descriptions earlier in this section of the report, will use more than one source of supply.
 - Although nearly half of the agencies contacted use VAN services, no agency projected an increase in the use of VAN service if GSA were to make VANs available through the TSP MASC.
- Agencies anticipate dramatic changes in the mix of voice/data and analog/digital communications during the next five years, as shown in Exhibit IV-9. From 1986 through 1990, data traffic will increase at a rate of two and a half to three times that of voice traffic, with the relative proportions of voice and data traffic coming into balance in the FY89 to FY90 timeframe.



EXHIBIT IV-6

FUTURE NETWORK CONTROL CENTER REQUIREMENTS

- Upgrades to Three VA Network Control Centers
- Service Oversight Centers for GSA's FTS 2000 and WITS
- Treasury
- State
- HUD (Part of the Capacity Replacement Program)



EXHIBIT IV-7

AGENCY LEASE/PURCHASE PREFERENCE

LEASE	NUMBER OF AGENCIES	PERCENT *
Lease	4	17
Lease-to-Purchase or Lease-to-Ownership	3	13
Purchase	12	52
Cost Analysis	4	17

*Percentages do not total 100 due to rounding.



EXHIBIT IV-8

AGENCY METHODS FOR ACQUIRING NEW OR
ENHANCED TELECOMMUNICATIONS SERVICE

	NUMBER OF AGENCIES
Use GSA or DCA-Sponsored Facilities	9
Buy Common Carrier Service	16
Buy VAN Service	9
Buy Integrated Systems	8
Buy Components and Integrate In-House	5
Buy Components and Use a Design or Integration Contractor	6



EXHIBIT IV-9

PERCENTAGE DISTRIBUTION OF TELECOMMUNICATIONS TRAFFIC

	CURRENT	FUTURE (1990)
Voice	70	50
Data	30	50
Analog	70	50
Digital	30	50



C. AGENCY ISSUES

I. ADAPTING IN THE POST-DIVESTITURE ENVIRONMENT

- Without exception, agency telecommunications officials cited adapting to the post-divestiture environment as the most significant problem they faced.
 - The effects of divestiture differed somewhat from agency to agency, with staffing shortages and slow vendor response mentioned most frequently.
 - Although the terms of the Modified Final Judgement (MFJ) became effective two years ago, agency officials anticipated no short-term resolution of their problems.
- Agencies with defense and national emergency missions have experienced severe problems obtaining adequate vendor response during exercises.
 - Before divestiture, only one contact with one vendor (AT&T) was required to activate emergency circuits and stations.
 - Now agencies must coordinate the activities of several vendors during emergency exercises.
 - Months after the end of a recent exercise, some telecommunications service still had not been activated by the vendors.
- Agencies with public service missions, such as IRS, have experienced similar vendor response delays in obtaining WATS service.
- Most agency telecommunications offices have insufficient qualified staff, with one or two individuals responsible for all telecommunications planning in some departments.



- These staffing levels were adequate when most telecommunications services were acquired through a single vendor.
- Agencies did not or could not add staff in anticipation of the increased workload after divestiture.

2. GSA TELECOMMUNICATIONS INITIATIVES

- GSA has examined agency requirements and enlisted agency participation in the planning of the FTS 2000 and WITS programs. Nonetheless, many agencies wonder whether these programs will resolve agency telecommunications problems or create or perpetuate them.
 - Agency officials expressed concerns over the cost of GSA telecommunications services. The current FTS billing method is considered to be unsatisfactory, and GSA has been unable to provide anything other than overall cost guidelines for the new programs.
 - Some agency telecommunications experts doubt that GSA and the vendor community can deliver all of the services specified for FTS 2000 and WITS. In addition, schedules for both programs have slipped, delaying eventual delivery of these services to meet agency requirements.
 - Individual agency programs to supply local and long distance communications have been delayed in the procurement process, pending evaluation of FTS 2000 and WITS against agency requirements.
 - FIRMR Bulletin 29 established a schedule for agency review and commitment to FTS 2000.



- Agencies wishing to obtain alternate service must have submitted their plans to GSA by March 31, 1986, or accept the possibility of automatic assignment to FTS 2000 for a period of three years.
- Agencies that have received a DPA for telecommunications services are exempt from this schedule. Those that have not received a DPA face a compressed timetable for gathering requirements and cost estimates to substantiate their plans for separate telecommunications service.
- The potential for problems does not end once an agency commits to the use of FTS 2000 or WITS. As GSA has noted, transition to these services will be a critical segment of each program. Although much of the burden for transition planning and continuation of service will be placed on the prime contractor, individual agencies will foot the cost of transition. Agencies also have responsibility for ensuring that agency telecommunications systems, such as PBX and terminal equipment, meet the FTS 2000 interface specifications.

3. OTHER AGENCY ISSUES

- Many federal buildings and facilities are of considerable age and not constructed to accommodate modern telecommunications cabling schemes. Federal agencies have explored "smart building" technology for new facilities, but have not resolved the problems with upgrading existing facilities. Short-term solutions such as cabling in surface-mounted conduit will prove inadequate and insufficiently flexible for future integrated voice/data telecommunications systems.



D. STANDARDS AND COMPATIBILITY

- Agency policymakers and planners face increasingly complex choices regarding the selection and enforcement of telecommunications standards. Such standards, however, are a key element of agency strategies to achieve interconnection and interoperability for existing and planned systems.
 - The federal inventory of voice and data communications hardware is extremely diverse, including equipment from every major manufacturer and many other suppliers. Even individual agencies or bureaus use equipment of various makes and models.
 - Despite recent modernization efforts, a significant proportion of the federal inventory consists of older equipment which cannot support newer standards.
 - Federal requirements for full and open competition preclude agencies from solving compatibility problems by standardizing on any given vendor's architecture.
- The AT&T divestiture has broadened the standards issue:
 - In the pre-divestiture environment, agencies and vendors merely followed Bell standards for voice and most data communications, such as the Bell 103 and 212 modem standards.
 - Telecommunications standards in the post-divestiture environment are established through consensus of federal regulatory and standards organizations, industry organizations such as ANSI and IEEE, and the vendor community.



- With this new uncertainty regarding responsibility for United States telecommunications standards, industry and the federal government have come under increased pressure to adopt or, as a minimum, provide interfaces for international standards.
 - Federal agencies with international missions depend on and comply with standards set by the indigenous PTT authorities.
 - Large vendors like IBM, who for years strictly promoted proprietary data communications networking and protocols, have responded to international market pressures in Europe and Japan.
- Although NBS and NCS have published joint telecommunications standards, these are not comprehensive with respect to the vast number of choices in the marketplace. The federal standards derived from international or industry standards are not up to date in some cases and represent only a subset of the source standard.
 - FIPS 100, the federal X.25 standard, is a subset of 1980 X.25 and has not been updated to reflect the 1984 standard.
 - FIPS 107 is roughly equivalent to the IEEE 802.2 and 802.3 LAN standards. Complete federal LAN standards are not expected until 1989.
 - Development of federal standards for transport, session, internetwork, message, and file transfer services progressed but was not completed in FY85 and FY86.
- OMB is considering mandating the use of OSI-compatible systems throughout the federal government. Even if a determination were made in FY86, its effect on the federal telecommunications market during the 1980s would be limited.



- The complete OSI model is a recommendation, not a firm, fixed standard. Furthermore, CCITT holds sessions to adopt recommendations only once every four years, with the next plenary session scheduled for 1988. This schedule, for example, precludes formal adoption of ISDN standards until at least 1988.
 - The OSI mandate realistically could not be made retroactive to cover existing federal systems due to size and life-cycle considerations.
 - Notwithstanding these difficulties, NBS estimates indicate that 70-80% of new system acquisitions in the early 1990s will be OSI-compatible. NBS regards vendor supply as the major constraint on the growth of this federal market segment.
- Statistics published in June 1985 by GSA's Office of Information Resource Management, Office of Systems and Technology Assessment indicate that federal agencies are adopting at least a subset of the OSI reference model for data communications.
 - Of five network protocol categories, only packet switching, based on X.25, shows any growth.
 - Use of older protocols such as ASCII and IBM BSC drops off dramatically, with IBM SNA/SDLC maintaining some popularity.
 - Several agencies have responded to the absence of comprehensive federal telecommunications standards by establishing agency standards, usually in conjunction with department-wide network acquisitions.
 - The Veterans Administration Data Transmission Service (VADATS) has been enhanced through the inclusion of a packet-switched value-added network. Through specialized hardware and software, VADATS



supports a variety of protocols on the underlying packet-switched architecture.

- . Asynchronous TTY (ASCII).
 - . IBM 3270 BSC.
 - . IBM 3780 BSC.
 - . X.25.
 - . IBM SDLC (in testing).
- The VA has accommodated existing protocols but requires X.25 interfaces for new mainframe and local-area network acquisitions. The X.25 standard is recommended for minicomputer and PBX acquisitions as well.
 - Department of the Interior policy specifies department-wide use of the USGS GEONET X.25 network service for dial-up data communications requirements.
 - USDA has issued a similar directive for department-wide data communications through the DEPNET X.25 network.
 - DoD has operated for several years under a directive to use the DDN and the associated TCP/IP protocol for all data communications. Although DoD has indicated a willingness to adopt OSI standards, transition will be slow.
- . The version of UNIX widely accepted in DoD and at ARPANET nodes includes TCP/IP and DDN interfaces.

Institution of new standards fits most logically with implementation of DSN, which is not scheduled to be fully operational until the early 1990s.

E. AGENCY PERSPECTIVES

- INPUT asked agency officials their views on major nontechnical impacts on federal telecommunications. Agency officials also provided suggestions for improvements vendors could make in telecommunications systems and services to increase their value to the government.

I. NONTECHNICAL IMPACTS

- Most agency officials felt that the aftereffects of the AT&T divestiture would continue to influence their plans and acquisitions for the foreseeable future. Agencies cannot predict the timing or effects of additional FCC regulatory actions and consequently encounter difficulty in forecasting telecommunications costs.
- Every agency expressed concern over congressional budget actions to counteract the rising federal deficit.
 - Agencies with security or emergency-preparedness missions felt less threatened by budget cuts.
 - In periods of budget reduction, use of telecommunications facilities, such as teleconferencing, gains favor as a cost-effective alternative to travel. FIRMR Bulletin 16, Travel by Federal Telecommunications System, substantiates this view.



- Reductions in the DoD budget would force some reprogramming of telecommunications funds.
- Strategic and tactical systems receive priority.
- Base communications modernization programs lose funding or are deferred to later years.

2. AGENCY RECOMMENDATIONS TO VENDORS

- Most agencies want vendors to work toward and support common telecommunications standards, whether or not the OSI reference model is adopted for federal standards. Vendors could address the government's protracted problems with system interconnection and interoperability by supplying compatible hardware architecture and communications protocols.
- Agencies also would prefer that vendors package telecommunications systems and services as integrated solutions for their requirements. Most agencies do not want to perform in-house system integration.
- Agency officials frequently commented on the vendor-buyer business relationship.
 - Vendors are too "opportunity" oriented and only concerned with making the next sale.
 - In conjunction with the previous comment, vendors could improve their image with federal officials through better pre- and post-award support.
 - Vendors should respond to the confusion over divestiture and the shortage of federal telecommunications expertise by providing more planning guidance.



- . Vendors need to increase the responsiveness and quality of service after a system goes into operation.
- Agency officials noted a growing need for secure telecommunications, including end-to-end encryption. Vendors should develop more and better secure systems and services. Current PBX equipment and facilities were mentioned as being particularly difficult to secure.









V COMPETITIVE TRENDS

- The view of the federal telecommunications market of representative vendors is presented and contrasted with the agency perspectives to assist in understanding the opportunities and concerns in this market.

A. POST-DIVESTITURE PERSPECTIVE

- Although the AT&T divestiture and associated regulatory actions have had the most noticeable recent impact on the telecommunications market, regulatory aspects of the market have been changing for over 30 years, since the initial 1956 DOJ antitrust action against AT&T.
 - In 1982, the Modified Final Judgement (MFJ) set forth the form of divestiture of AT&T, effective January 1, 1984.
 - The current FCC Computer Inquiry III is an ongoing effort, focused mainly on the BOCs to review the structural separation requirements of the MFJ. The FCC is considering redefinition of structural separation in terms of dominant market position rather than basic versus enhanced services.
- With all of the publicity surrounding the AT&T divestiture, some other regulatory actions of importance to the federal market were all but ignored. The



Record Carrier Competition Act of 1982 effected similar deregulation in the telegraph and teletype market. The U.S. domestic market was opened to the International Record Carriers (IRCs) and restrictions on Western Union were removed.

- Although the recent regulatory actions have opened competition for telecommunications equipment and service, the regulated and tariffed services still exist. The RBOCs in particular are affected by continued regulation which restricts their participation in the federal market.
 - Local service remains regulated by the state public utility commissions.
 - Most recent waiver requests related to the structural separation requirements of divestiture have been denied.
- Complete deregulation of the telecommunications industry is unlikely through the 1990s.
 - The nation's communications systems are regarded as essential parts of defense, security, and emergency programs. From the government perspective, effective management of these programs demands some level of federal control over the telecommunications market.
 - Consumer lobbies contend that complete deregulation would result in a loss of service to the public in less profitable markets and in excessive price escalation. Although these contentions are difficult to confirm, even the chance of either occurrence exerts pressure on the government to continue regulation.
 - The FCC and the Justice Department have shown increased hesitance to grant waivers and further open the market. In particular, the RBOCs continue to be restricted from the provision of certain types of enhanced services.



- The AT&T divestiture and earlier deregulation efforts undoubtedly have redefined the market, but the net benefit for federal buyers and users is still at issue.
- Although the absolute number of telecommunications vendors has increased, with concomitant price competition, the long-term viability of many smaller suppliers is uncertain. Federal buyers are accustomed to the stability and proven performance of established companies such as AT&T.
- With or without divestiture, success in the telecommunications market depends heavily on capital investment. Smaller companies cannot afford the initial investment, much less the ongoing expense of maintaining state-of-the-art products and services in an environment of rapid technological change. Even the larger telecommunications companies must absorb a relatively high cost over the next several years for replacement of older wire and analog facilities with fiber optic, satellite, and microwave digital technology.
- Among the new entrants in the post-divestiture federal telecommunications market, systems houses and, to a lesser extent, RCS vendors appear to be enjoying the most success. Both groups of vendors have been able to leverage previous federal market experience and existing telecommunications facilities to enhance pre-bid position and hold down costs.



B. FEDERAL TELECOMMUNICATIONS VENDORS

- Since divestiture, and particularly during this past year, the telecommunications market has been undergoing rapid change with regard to vendor participation in the federal sector.
 - Only a few telecommunications vendors and systems houses are visible in the federal market.
 - Some key 1985 revenue information was unavailable for this report, but sufficient data was obtained to identify several competitive trends.
- The following subsections of this report discuss the relative market positions of federal telecommunications vendors identified by INPUT, as shown in Exhibit V-1. The list of vendors is not exhaustive but does identify the vendors on major recent federal telecommunications contracts.

I. AT&T

- AT&T holds the dominant position in the federal telecommunications market, primarily due to its role as a long-haul communications supplier.
 - AT&T FY85 revenue from network services alone was approximately \$1 billion.
 - Other lines of business, such as communications equipment, computer hardware, and specialized networks, serve to enhance this position.
- AT&T recently reemphasized its intentions to hold and increase federal market share through the formation of a new federal marketing operation in Washington, D.C. The new operation is authorized to market all AT&T products and services to the federal government.



EXHIBIT V-1

FEDERAL TELECOMMUNICATIONS VENDORS

- AT&T
- Other Network Service Vendors
 - MCI
 - TELENET
 - TYMNET
 - Boeing (BCS)
 - Western Union
 - RCA
 - U.S. Telecom
 - CONTEL
- Communications Hardware Vendors
 - Rolm
 - Northern Telecom
 - BOCs
 - AT&T
 - BBN
- Systems Houses
 - EDS
 - CSC
- IBM



- Although many industry analysts questioned the company's overall ability to adapt in the face of new competitive pressures after divestiture, AT&T has responded successfully in the federal market.
 - AT&T won two major GSA telephone equipment procurements, POTS for Region 3 and the National Capital Region, and ASP Region 1.
 - AT&T is implementing the DCTN for DCA, an ISDN prototype scheduled to be operational in early CY86.
 - AT&T is part of the CSC team (with BBN) building the U.S. Customs Network.
- AT&T has lost some potential federal business in the VAN and PBX market segments. The company's strong overall market position, however, will be maintained throughout the 1980s.
 - AT&T is the only long distance carrier with a fully operational network in every state with more than one LATA.
 - AT&T has historical ties with the foreign PTTs for international service. Although several of the Other Common Carriers (OCCs) and the RBOCs recently entered business relationships with PTTs, AT&T is better known and has a broader base in the international community.
 - AT&T has achieved more consistent success than the RBOCs in applying for and receiving waivers from the provisions of the MFJ.
 - AT&T is positioned uniquely to take advantage of product synergy between its switching and computer equipment lines. The 5ESS switch, for example, is based on a 3B series computer. Such coupling of computer and communications technology is not available to other vendors except through teaming or subcontracting.

2. OTHER NETWORK SERVICE VENDORS

- The federal government also acquires long-haul communications from a number of the OCCs. The combined cost and volume of service acquired from the OCCs, however, is far less than that acquired from AT&T.
 - The OCCs tend to rank their federal market performance relative to each other, excluding AT&T.
 - MCI was the first of the OCCs to provide service to GSA as part of FTS. MCI has exploited its early market entry to build and maintain the largest federal market share for long distance service among the OCCs.
- GTE Telenet and McDonnell Douglas TYMNET are the two primary suppliers of VAN service to federal agencies. Both companies hold several department-wide network contracts.
 - In contrast to the common carrier network market, AT&T has met with limited success in marketing its X.25 Accunet service to federal agencies.
 - The addition of VAN service to the TSP will have little impact on the share of the market held by TYMNET and Telenet, since their most recent federal contracts extend for five or more years. It will open the market, however, to new competition from RCS vendors, such as Boeing Computer Services, on new agency VAN requirements.
 - Full implementation of FTS 2000 may weaken the position of all VAN vendors in the federal telecommunications market during the late 1980s. The service requirements for FTS 2000 include many features, such as protocol conversion and electronic mail, currently acquired by agencies primarily through VANs.

- The aforementioned long-haul communications services employ a mix of transmission technologies, such as standard wire cable, microwave, and satellite circuits. Satellite networks as distinct, separately acquired commercial services were identified infrequently in the federal government.
- CONTEL, a growing force in federal telecommunications, could provide satellite service through its recent acquisition of American Satellite.
- Western Union (WU) Federal supplies the OPMODEL satellite network for DOE; WU Federal is now part of CONTEL/American Satellite Corporation.
- RCA has provided international satellite service to DoD and could be in an even stronger market position following the RCA/GE merger.
- MCI will be in a position to offer satellite service following its acquisition of SBS from IBM.

3. COMMUNICATIONS HARDWARE VENDORS

- The near monopoly on customer-premises equipment held by the pre-divestiture Bell System is being eroded steadily. Agencies are replacing the once ubiquitous CENTREX service with digital voice/data PBX equipment from a variety of vendors, with Rolm and Northern Telecom apparently leading in the number of recent installations.
- Companies such as Northern Telecom have increased market share both through direct sales and by acting as a supplier to systems houses and telecommunications systems vendors.
- The BOCs have shown no sentimentality for old Bell System ties in their selection of new switching equipment from sources other than AT&T.

- Even though AT&T won the Region I ASP procurement and maintains a considerable installed base at military facilities, future prospects for federal communications hardware awards to AT&T may not be as bright.
 - Both GSA and DoD are under pressure to maintain both the substance and the appearance of competitive contracting as specified by CICA.
 - The "maintenance change-out" policy employed by DoD to upgrade existing obsolescent AT&T base communications facilities has come under OMB scrutiny, notwithstanding DoD commitments that the upgrades will not alter scheduled competitive replacement of the AT&T equipment.
- BBN, like AT&T, continues to be a major supplier of both telecommunications hardware and professional services to DoD.
 - Much of the seminal work on DoD communications protocols was done by BBN, and the company has applied this experience to build a lasting business relationship.
 - BBN has shown intentions to expand its market in the civilian agencies, for example, through its work with CSC and AT&T on the U.S. Customs Network.

4. SYSTEMS HOUSES

- The traditional systems houses are the newest entrants in the federal telecommunications market. Their considerable experience as integrators and prime contractors uniquely positions them to take advantage of the post-divestiture environment where communications hardware, long distance and local service, and professional services are not available from a single vendor.

- CSC, with its relatively early success in federal telecommunications, leads the systems houses and will grow as a force in the market.
- EDS is positioned to capture an increasing share of the federal telecommunications market.
 - GM/EDS already operates the largest private telecommunications network outside the federal government.
 - The recent acquisition of Hughes supplements GM/EDS experience in long haul networks and communications.

5. IBM

- Much as is the case for AT&T, IBM involvement in the federal telecommunications market deserves special attention. Although never a major participant in the market as a carrier, IBM has set de facto industry standards for data communications and networks including the BSC and SDLC protocols and SNA networking.
- Even considering recent acquisitions, IBM lacks certain capabilities which would allow the company to be regarded as a full-service telecommunications vendor.
 - The Rolm hardware suite lacks a backbone-class switch equivalent to the AT&T 5ESS.
 - IBM sold SBS to MCI, but obtained in return only a minority interest in MCI, thereby trading away IBM's only complete control of network facilities.
- Other competitors in the federal telecommunications market, however, can not afford to become complacent about the potential for IBM forays into the market.



- IBM has the capital to compete in every segment of the market if it wants.
- IBM has shown interest in bidding the FTS 2000 procurement as a prime.
- IBM's FSD exhibits many of the same positive characteristics noted above for systems houses with extensive federal market experience and a proven capability to integrate communications, hardware, and software from a variety of vendors.

C. VENDOR FEDERAL TELECOMMUNICATIONS MARKET PLANS

- The following discussion examines three specific aspects of vendor plans for the federal telecommunications market.
 - Standards.
 - Industry reaction to FTS 2000.
 - Industry reaction to VANs on the TSP.

I. STANDARDS

- Vendors and federal agencies basically agree about the trend toward the application of OSI standards for federal telecommunications.
- Forty percent of the vendors interviewed currently support some subset of the OSI standards, usually X.25. Nearly one-third of the vendors also support SNA and TCP/IP (a DDN protocol).



- The full OSI reference model and associated standards will gain additional vendor support during the next five years. Nearly 65% of the vendors will maintain, expand, or add OSI support over that time period. NBS also estimates that 24 vendors will announce OSI-compatible products in CY86.
- Even vendors with a strong commitment to proprietary protocols are responding to the federal trend toward OSI. For example, IBM has made public statements of direction about OSI and is an active participant in NBS-sponsored OSI activities.
- In addition to participating in demonstrations of OSI-based MAP/TOP systems, NBS coordinates vendor activities on OSINET, an X.25 network provided by AT&T and Wang for developing, testing, and demonstrating OSI protocols and products. Major vendor participants in OSINET and recent OSI workshops are listed in Exhibit V-2.

2. INDUSTRY REACTION TO FTS 2000

- Since FTS 2000 is the largest single federal telecommunications network acquisition planned between FY86 and FY90, and since contract award and implementation potentially effects all vendors and federal agencies, INPUT asked both vendors and federal agencies to comment on the procurement.
- As shown in Exhibit V-3, most vendors believe that centralization of federal telecommunications is in the best interest of the government overall. The percentage of responses, however, nearly reverses when the best interests of individual agencies are considered. This difference reflects concerns similar to those expressed by the agencies regarding GSA's understanding of their individual telecommunications requirements.
- Most vendors also agree that the successful FTS 2000 prime bidder and any subcontractors would gain a substantial competitive edge in federal telecom-



EXHIBIT V-2

OSINET AND OSI WORKSHOP VENDOR PARTICIPANTS

Amdahl
AT&T
Boeing Computer Services
Charles River Data Systems
Digital Equipment Company
General Motors
Hewlett-Packard
International Computers, Ltd.
IBM
NCR COMTEN
Olivetti
Software Decisions, Inc.
Tandem
Wang

Note: A total of 173 vendors and federal agencies have participated in the OSI workshop series.

EXHIBIT V-3

VENDOR OPINION OF CENTRALIZED FEDERAL TELECOMMUNICATIONS

	BEST INTEREST	
	GOVERNMENT OVERALL	INDIVIDUAL AGENCIES
Yes	67%	39%
No	33%	61%

N = 18; seven other vendors had no opinion
or chose not to comment.

munications over the term of the contract. Current FTS common carrier and federal VAN suppliers stand the greatest risk of losing future business due to FTS 2000.

- Some vendors also voiced the opinion that the FTS 2000 procurement, as described in the current draft RFP, unfairly restricted competition. Release of the RFP in its current form and subsequent contract award could result in numerous protests and litigation.

3. INDUSTRY REACTION TO VANs ON THE TSP

- Of the 25 vendors that INPUT contacted, 10 either supply or plan to supply VAN services to federal government.
- Opinion among the 10 VAN suppliers regarding GSA plans to include VAN service on the TSP was mixed, with no clear preference for or against the GSA plan.
- Vendors believe that inclusion of VANs on the TSP offers federal agencies several benefits.
 - Economies of scale.
 - Faster availability of new technology.
 - Simplified procurement.
- The only disadvantage centered on the difficulty of evaluating vendor technical offerings and costs within the current TSP framework.

- Vendors foresee both advantages and disadvantages for themselves as well.
 - Advantages--offering multiple services through a single contract, bolstering RCS revenues, increased volume of federal business.
 - Disadvantages--reduced margin for RCS, increased competition.

D. VENDOR CONCERNS

- In more general commentary about the federal telecommunications market, vendors voiced a number of concerns about federal organization, staffing, and procurement practices.

I. FEDERAL ORGANIZATION AND STAFFING

- Vendors expressed some frustration with government progress toward integrated voice and data communications management.
 - Although the agency OIRM nominally manages both data and voice communications, corresponding organizational changes have been made only recently or are still in progress or incomplete.
 - Vendors have had difficulty determining exactly which office or offices are responsible for telecommunications initiatives.
 - In some agencies where voice and data communications are acquired and managed separately, vendors receive contradictory information about long-range agency telecommunications plans.
- Vendors recognize that most agencies are short on telecommunications expertise. Vendors also perceive that, as a result, RFPs and associated live



test demonstrations and benchmarks contain terms and conditions and specifications which are inappropriate for telecommunications systems.

- Agencies with in-house telecommunications expertise, on the other hand, tend to over-specify solutions and standards for telecommunications systems rather than stating requirements and allowing vendors to bid appropriate technical solutions.

2. FEDERAL PROCUREMENT PRACTICES

- Vendors believe that federal agencies should place less emphasis on selection of the lowest bidder in telecommunications procurement. Services may not be directly comparable from vendor to vendor due to a lack of standard offerings.
- Some vendors feel that government agencies have not taken FCC regulation and the AT&T divestiture into account when stating RFP requirements. As a result, some acquisitions have been less than fully competitive.
- Other vendor concerns about full and open competition were directed specifically at DoD telecommunications acquisitions. Except for those companies with existing DoD telecommunications contracts, vendors regard DoD directives, especially those relating to the use of DDN, as unnecessarily restrictive.

E. INPUT RECOMMENDATIONS

- Telecommunications vendors need to invest more time and effort in understanding agency missions and related communications requirements.
 - Many acquisitions support multiple missions.

- Other acquisitions support several parts of an agency or department with diverse functions or missions.
- Awareness of unstated constraints or future directions is essential to bidding strategy.
- At least for the near future, vendors can help agencies prepare better solicitations while improving their strategic position.
 - Offer briefings or seminars on key technical issues.
 - Respond to agency Requests for Information and Statement of Work drafts.
 - Send technical bulletins to agency management, technical, and contracting officials.
- Vendors need to emphasize comprehensive, lasting solutions to agency telecommunications requirements. Several related agency concerns must be addressed by vendors' proposals.
 - Long-term compatibility and expandability of the proposed system.
 - Corporate stability and commitment to the market.
 - Continuation of service after award and implementation, particularly for communications hardware.
- Vendors wishing to enter or expand their share of the federal telecommunications market face a number of significant barriers.

- Competition in the market is capital intensive and can require considerable pre-solicitation investment.
- Many new telecommunications systems have been acquired in FY85 and FY86, with projected system life cycles of five to ten years.
- Development of new telecommunications products and services is costly in terms of capital investment and qualified personnel.
- To overcome the aforementioned barriers, vendors should investigate the following strategies:
 - Develop teaming or subcontracting relationships with larger federal vendors, especially those active in systems integration.
 - Target new products and services for specific growing areas of interest to federal agencies.
 - Interconnection and interoperability of existing hardware.
 - Teleconferencing facilities.
 - Professional services including training and telecommunications system design, management, and maintenance.
 - Plan products and services around the OSI model to meet future federal requirements. Participation in NBS-sponsored OSI activities seems to present a cost-effective approach to research and development in this area.
- Telecommunications hardware vendors must be watchful of current federal buying trends and be prepared to supplement their revenues beyond FY87 by providing additional enhancements and services for systems acquired in FY85 and FY86.





VI KEY OPPORTUNITIES

- This section describes specific opportunities in the federal telecommunications market. Following the initial discussion of program funding and identification, two lists of typical major programs are provided.
 - Recent awards.
 - Future opportunities.
- Some programs are listed because they include significant communications support to be met by the program or through related agency telecommunications programs.
- The list of opportunities becomes smaller after FY87 because new programs have not yet been identified or initially approved by the responsible agency. Subsequent issues of this report and the INPUT Procurement Analysis Reports will include new programs and detailed program information for the FY88-FY91 timeframe.

A. PRESENT AND FUTURE PROGRAMS

- Funding for telecommunications systems and services appears in several budget categories of federal government agencies.

- Telecommunications systems and services requirements may be separately identified but included in the funding for overall information systems program procurements.
 - Funding for telecommunications networks is reported as commercial services or as interagency payments when such services are provided by GSA (e.g., FTS).
 - Equipment acquired through LTOP procurements (lease-to-purchase, lease-to-ownership) appears in the leased equipment category.
 - Service costs for hardware maintenance and repair may be identified separately or included in the initial contract funding for the hardware acquisition.
- New telecommunications programs that are larger than \$1-2 million are listed in at least one of the following federal government documents.
 - OMB/GSA Five-Year Plan which is developed under the Paperwork Reduction Act from agency budget requests submitted in compliance with OMB Circular A-11, Section 43A/B.
 - Agency long-range information resource plans developed to meet the reporting requirements of the Paperwork Reduction Act of 1980.
 - Agency annual operating budget requests submitted to both congressional authorization and appropriations committees based on the OMB A-11 information.
 - Commerce Business Daily for specific telecommunications opportunities, for qualification as a bidder, and to obtain a copy of an RFP or RFQ.



- Five-Year Defense Plan, which is not publicly available, and the supporting documentation of the separate military departments and agencies.
- Classified program documentation available to qualified DoD contractors.
- Non-defense contractors are encountering increasing difficulty in reviewing information systems acquisition plans which are related to national security prior to notices in the CBD.
 - This general difficulty appears to be more acute for telecommunications systems which are acquired as part of weapons or strategic programs. Funding for these programs typically is not regarded by the agencies as part of the information technology budget.
 - The number of reporting exceptions under the Warner Amendment to the Brooks Act has grown dramatically, further obscuring defense acquisition plans.
 - As a consequence of these trends, specific details about defense telecommunications programs such as funding and schedule are not generally available to the public.
- All funding proposals are based on cost data of the year submitted with inflation factors dictated by the administration as part of its fiscal policy and are subject to revision, reduction, or spread to future years in response to congressional direction. Some additional reductions will be likely in FY87 and beyond due to the deficit reduction constraints of the Gramm-Rudman-Hollings Act.

B. RECENT TELECOMMUNICATIONS AWARDS

<u>AGENCY/PROGRAM (PAR REFERENCE)</u>	<u>CONTRACTOR(S)</u>	<u>VALUE (\$M)</u>
DEPARTMENT OF DEFENSE - AIR FORCE:		
Network Control Center (V-1-57)	CODEX	1.6
Academy Local-Area Network	CONTEL, KEE	6.7
DEPARTMENT OF DEFENSE - ARMY:		
Key Telephone Systems	AT&T, Siemens	16.0
Korean Telephone System Upgrade	Northern Telecom	
DEPARTMENT OF DEFENSE - NAVY:		
ELF Communications System	GTE	3.9
Advanced Narrowband Digital Voice/Data Terminal	ITT	14.5
DEPARTMENT OF DEFENSE - DEFENSE COMMUNICATIONS AGENCY:		
Defense Commercial Telecommunications Network (DCTN)	AT&T	400.0
CIVIL - AGRICULTURE:		
Automation of State and County Offices (VI-5-3)	IBM	110.0
DEPNET Data Communications Network (VI-5-4)	GTE Telenet	150.0
Electronic Management and Dissemination of Information (VI-5-5)	Martin Marietta	84.8
CIVIL - COMMERCE:		
Central Computing Facility (VI-6-16)	CDC	7.2

CIVIL - ENERGY:

OPMODEL Operational Model Wideband Network (VI-7-70)	Western Union	28.6
Washington Metropolitan Area PBX	CONTEL Northern Telecom	

CIVIL - INTERIOR:

USGS GEONET	TYMNET	20.8
Bureau of Indian Affairs TSP Contract	Martin Marietta	25.0
Menlo Park and Reston PBX	RoIm	

CIVIL - JUSTICE:

INS Automated Intrusion Detection System (VII-10-4)	IBM	2.3
INS Automated Management Information Civil User System (VII-10-8)	Four-Phase	5.5

CIVIL - TRANSPORTATION:

Integrated Voice/Data Communications System (VII-11-1)	Northern Telecom	9.5
USGS Payroll Source Data Automation (VII-11-2)	C3 GTE Telenet	REQS ¹ REQS

CIVIL - TREASURY:

Customs Integrated Network System	CSC, AT&T, BBN	282.0
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CIVIL - GENERAL SERVICES ADMINISTRATION:

Region 1 Aggregated Switch Procurement (ASP)	AT&T	
National Capital and Region 3 Purchase of Telephone Systems (POTS)	AT&T	

¹Requirements contract

CIVIL - NASA:

Johnson Space Flight Center Telecommunications System	Rolm	14.9
Goddard Space Flight Center Telecommunications System	Rolm	
Marshall Space Flight Center Telecommunications System	Boeing	
Lewis Research Center Telecommunications System	GTE	
National Space Technical Laboratory Telecommunications System	South Central Bell	

CIVIL - VETERANS ADMINISTRATION:

Supply Processing and Distribution System (VIII-16-5)	SMS, Data Products	1.8
Advanced Records System Replacement	Tisoft	8.4

CIVIL - ENVIRONMENTAL PROTECTION AGENCY:

Telecommunications Network	Racal Milgo	1.0
Telecommunications Network	Capital Systems	0.9

CIVIL - TENNESSEE VALLEY AUTHORITY:

Muscle Shoals PBX	Northern Telecom	2.6
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C. TELECOMMUNICATIONS OPPORTUNITIES BY AGENCY

<u>AGENCY/PROGRAM</u>	<u>PAR REFERENCE</u>	<u>SCHEDULE</u>	<u>FY85-FY90 FUNDING (\$M)</u>
DEPARTMENT OF DEFENSE - AIR FORCE:			
MAJCOM Information System	V-1-2		57.5
Materials Research Automation	V-1-16	RFP 3QFY86	2.0
WWMCCS Information System (AFWIS)	V-1-27		85.5
WWMCCS Information System (WIS)	V-1-32		702.4
Air Staff Local-Area Network	V-1-69		16.6
Operations System Network (OPSNET)	V-1-79	1QFY87	15.9
AFCAC Network Interface Units	V-1-99		3.0-4.0 ²
MAC Information Processing System (MAC-IPS)	V-1*	RFP 8/86	121.3
DEPARTMENT OF DEFENSE - ARMY:			
Army National Guard Management Information System	V-2-6		145.1
WWMCCS Information System (AWIS)	V-2-8		546.1
Corps of Engineers Automation Plan Option I (CEAP - I)	V-2-9		95.0
DEPARTMENT OF DEFENSE - NAVY:			
Navy Laboratory Technical Office Automation and Communications System (NALTOACS)	V-3-1		137.6

²Estimated

*To be included in a future PAR release

CNO POM Process Hardware System	V-3-67		7.6
FMS Communications Services	V-3-74		18.5
NAVSUP Headquarters Project (NAVSUPSYSCOM)	V-3-76	4QFY86	17.7

DEPARTMENT OF DEFENSE - DEFENSE LOGISTICS AGENCY:

Defense Automatic Addressing System (DAAS) ADPE Replacement Program (DARP)	V-4A-4		14.9
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DEPARTMENT OF DEFENSE - DEFENSE NUCLEAR AGENCY:

WWMCCS Information System (WIS)	V-4B-3		50.6
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CIVIL - AGRICULTURE:

Modernization of ARS Telecom- munications Nationwide	VI-5-11		11.6
Agriculture Washington Area Telephone Services (AWATS)	VI-5-14		26.6

CIVIL - HEALTH AND HUMAN SERVICES:

Integrated IHS Hospital Information System	VII-8-22		5.3
Replacement Procurement for All Automated Office System (AOS) Equipment	VII-8-23	RFP FY88	2.7
Departmental Switch Procurement	VII-8*	FY86	52.8
SSA Digital Telephone Switch	VII-8*		
SSA Data Communications Utility	VII-8*	Awards FY86	

*To be included in a future PAR release



CIVIL - HOUSING AND URBAN DEVELOPMENT:

HUD Capacity Replacement System	VII-9B*	RFP 11/86	300.0
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CIVIL - JUSTICE:

FBI Field Office Information Management System (FOIMS)	VII-10-2		236.9
INS Integrated Network Communications (INSINC)	VII-10-5	FY88	24.9
FBI Computer Application Communications Network (CACN)	VII-10-9		198.8
Automated Information Systems Plan Implementation	VII-10-10		22.2
National Data Network	VII-10-11		48.7
Replacement of Washington DOJ CENTREX II System	VII-10-12		22.0

CIVIL - TREASURY:

IRS Federal Area Records Data Link (Formerly FARC)	VII-12-10		4.8
Teleprocessing Services Contract	VII-12-30	3QFY86	7.0
IRS Service-wide Integrated Telecommunications Network	VII-12-32		350.4
IRS Service Center Accounting/Integrated Management System	VII-12-35	RFP 4/86	10.2
Secret Service Integrated Network	VII-12-39		25.5
IRS Financial Center Telecommunications Network	VII-12-46		7.4

*To be included in a future PAR release



CIVIL - GENERAL SERVICES ADMINISTRATION:

Federal Telecommunications System (FTS 2000)	VIII-14-16	1,200.0
Aggregated Switch Procurement (ASP)	VIII-14*	
Washington Interagency Telephone System (WITS)	VIII-14*	

CIVIL - NASA:

Integrated Office Automation System (OAS)	VIII-15-56	6.3
Johnson Space Flight Center - Space Station Definition and Preliminary Design	VIII-15-61	
Goddard Space Flight Center - Customer Data and Operations System (CDOS)	VIII-15-62	
Johnson Space Flight Center - Technical Management Information System (TMIS)	VIII-15-64	
Langley Research Center Telecom- munications System	VIII-15* 4/86	14.9

CIVIL - VETERANS ADMINISTRATION:

Integrated Data Communications Utility	VIII-16*	
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CIVIL - ENVIRONMENTAL PROTECTION AGENCY:

Telecommunications Network	VIII-17*	10.0
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*To be included in a future PAR release

CIVIL - TENNESSEE VALLEY AUTHORITY:

Administrative Telephone System
Upgrade

VIII*

3QFY86

24.1

*To be included in a future PAR release



APPENDIX A: INTERVIEW PROFILES

A. FEDERAL AGENCY RESPONDENT PROFILE

I. CONTACT SUMMARY

- Contacts with agencies were made both by telephone and through on-site visits. The distribution of contacts is shown below.

	<u>On-Site</u>	<u>Telephone</u>	<u>Total</u>
Civil	15	24	39
DoD	<u>2</u>	<u>17</u>	<u>19</u>
Total	17	41	58

- On-site interviews were conducted primarily at the department level with officials in the Office of Information Resources Management who are responsible for communications policy and planning.
- The distribution of job classifications among individual agency respondents was as follows.



	<u>Policy</u>	<u>Buyers</u>	<u>Users</u>	<u>Total</u>
Civil	12	1	26	39
DoD	<u>11</u>	<u>2</u>	<u>6</u>	<u>19</u>
Total	23	3	32	58

2. LIST OF AGENCIES INTERVIEWED

- Department of Agriculture.
- Department of Commerce.
 - National Bureau of Standards.
 - National Telecommunications and Information Administration.
- Department of Defense.
 - Air Force.
 - Army.
 - Navy.
 - Defense Communications Agency.
 - Defense Mapping Agency.
 - Office of the Joint Chiefs of Staff.
 - Washington Headquarters Staff.



- Dependent Schools.
- National Guard Bureau.
- Department of Education.
- Department of Energy.
- Federal Emergency Management Agency.
- General Services Administration.
 - WITS Program Office.
 - ASP Program Office.
 - Office of Network Engineering.
 - Office of Regional Information Services.
 - Office of Technology Assessment.
- Department of Housing and Urban Development.
- Department of Interior.
 - Office of Information Resources Management.
 - Bureau of Reclamation.
 - Bureau of Land Management.
 - United States Geological Survey.

- National Aeronautics and Space Administration.
- Nuclear Regulatory Commission.
- Office of Management and Budget.
 - Office of Information and Regulatory Affairs.
- Small Business Administration.
- Department of State.
- Tennessee Valley Authority.
- Department of Transportation.
 - United States Coast Guard.
 - Federal Aviation Administration.
- Department of the Treasury.
 - Internal Revenue Service.
 - United States Customs Service.
- United States Information Agency.



B. VENDOR RESPONDENT PROFILE

- INPUT contacted a representative sample of vendors who provide telecommunications systems or services to the federal government. These systems and services include:
 - Communications hardware.
 - Computer hardware.
 - Local-area network (LAN).
 - Common carrier (inter- and intra-LATA).
 - Value-added network (VAN).
 - Remote computing services (RCS).
 - Professional (consulting) services.
 - System integration.
- The distribution of job classifications among the 25 individual vendor respondents was as follows:

- Marketing	12
- Executive	10
- Other	3
- All contacts with vendor personnel were made by telephone.





APPENDIX B: DEFINITIONS

- Telecommunications vendors in the federal government market make proposals on a wider range of systems and services than vendors in commercial markets. To accommodate the range of programs described in the OMB Five-Year Plan and agency long-range information technology plans, the definitions in this appendix include hardware, software, services, and telecommunications categories.
- Alternate service mode terminology employed by the federal government in its procurement process is defined along with INPUT's regular terms of reference, as shown in Exhibit B-1.
- The federal government's unique nontechnical terminology that is associated with applications, documentation, budgets, authorization, and the procurement/acquisition process is included in Appendix C, Glossary.

A. SERVICE MODES

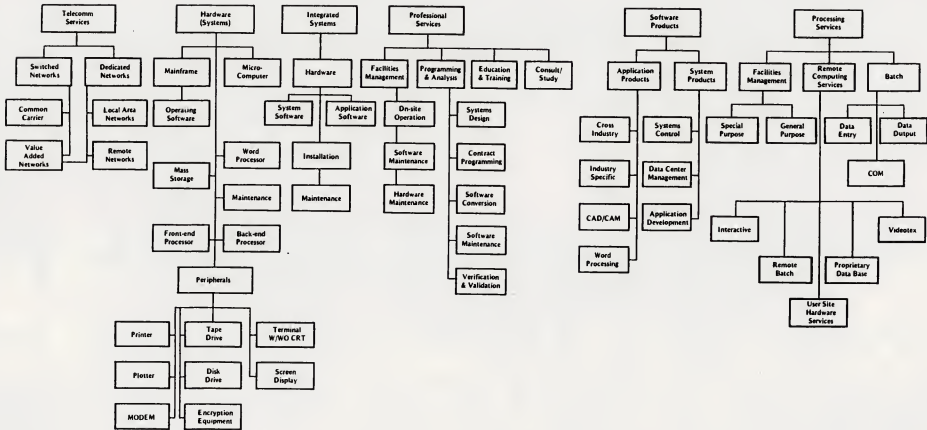
I. PROCESSING SERVICES

- Processing services include remote computing services, batch services, and processing facilities management.



EXHIBIT B-1

FEDERAL INFORMATION SYSTEMS AND SERVICES PROGRAM SYSTEMS AND SERVICES MODES





- REMOTE COMPUTING SERVICES (RCS) - Provision of data processing to a user by means of terminals at the user's site(s). Terminals are connected by a data communications network to the vendor's central computer. The most frequent contract vehicle for RCS in the federal government is GSA's Teleprocessing Services Program (TSP). RCS includes five submodes.
 - INTERACTIVE (timesharing) - Characterized by the interaction of the user with the system, primarily for problem-solving timesharing, but also for data entry and transaction processing; the user is on-line to the program/files.
 - REMOTE BATCH - Where the user hands over control of a job to the vendor's computer which schedules job execution according to priorities and resource requirements.
 - PROPRIETARY DATA BASE - Characterized by the retrieval and processing of information from a vendor-maintained data base. The data base may be owned by the vendor or by a third party.
 - USER SITE HARDWARE SERVICES (USHS) - These offerings provided by RCS vendors place programmable hardware at the user's site rather than the vendor's data center. Some vendors in the federal government market provide this service under the label of distributed data services. USHS offers:
 - Access to a communications network.
 - Access through the network to the RCS vendor's larger computers.
 - Local management and storage of a data base subset that will service local terminal users via the connection of a data base processor to the network.
 - Significant software as part of the service.



- BATCH SERVICES - These include data processing performed at vendors' sites for user programs and/or data that are physically transported (as opposed to transported electronically by telecommunications media) to and/or from those sites. Data entry and data output services, such as keypunching and computer output microfilm processing, are also included. Batch services include expenditures by users who take their data to a vendor site that has a terminal connected to a remote computer for the actual processing.

- PROCESSING FACILITIES MANAGEMENT (PFM) - Also referred to as "Resource Management," "Systems Management," or "COCO" (contractor-owned, contractor-operated). The management of all or part of a user's data processing functions under a long-term contract of not less than one year. This would include remote computing and batch services. To qualify as PFM, the contractor must directly plan, control, operate, and own the facility provided to the user, either on-site, through communications lines, or in a mixed mode.

2. PROFESSIONAL SERVICES

- Professional services include consulting, education and training, programming and analysis, some facilities management, and systems integration as defined below.

- CONSULTING SERVICES - Information systems and/or services management consulting, program assistance (technical and/or management), feasibility analyses, and cost-effectiveness trade-off studies.

- EDUCATION AND TRAINING - Products and/or services related to information systems and services for the user, including computer-aided instruction (CAI), computer-based education (CBE), and vendor instruction of user personnel in operations, programming, and maintenance.



- PROGRAMMING AND ANALYSIS - Also known as software development services, includes system design, contract or custom programming, code conversion, independent verification and validation (IV&V), and benchmarking. These services may also include follow-on and software maintenance.
 - PROFESSIONAL SERVICES FACILITIES MANAGEMENT (PSFM) - Also referred to as GOCO (government-owned, contractor-operated). The computing equipment is owned or leased by the government, not by the vendor. The vendor provides the staff to operate, maintain, and manage the government's facility. Submodes include:
 - OPERATION AND MAINTENANCE (O&M) - Vendor operation and maintenance of government-owned ADP/telecommunications equipment in a government-owned/leased facility (on-site) without vendor management of the facility.
 - HARDWARE AND/OR SOFTWARE MAINTENANCE - Vendor-furnished services provided after installation and acceptance by the government, where the vendor may not be the original supplier (third-party maintenance or TPM), and may use either on-site or on-call personnel to perform services.
 - SYSTEMS INTEGRATION - Services associated with systems design and integration, and installation and government acceptance of ADP/telecommunications systems may be provided with related engineering activities such as systems engineering and integration (SE&I) or systems engineering and technical assistance (SETA).
3. INTEGRATED SYSTEMS
- Also known as turnkey systems, integrated systems include systems and applications software packaged with hardware as a single entity. Most



CAD/CAM systems and many small business systems are integrated systems. This mode does not include specialized hardware systems such as word processors, cash registers, and process control systems.

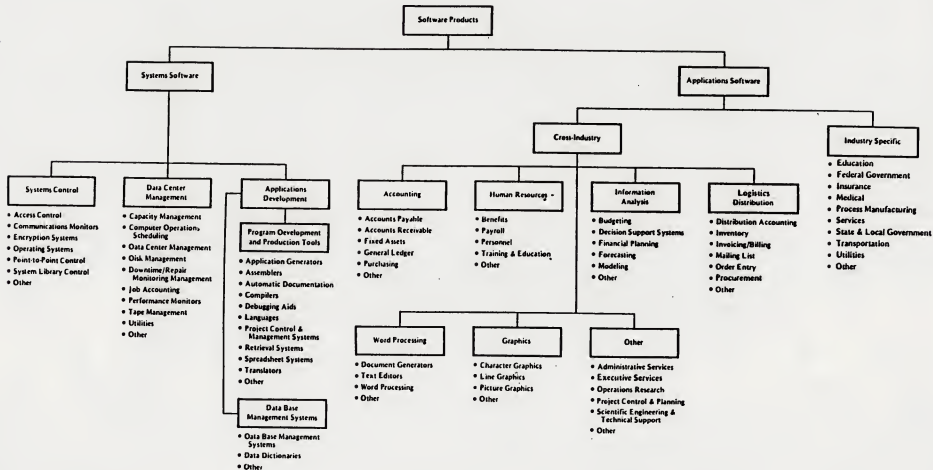
4. SOFTWARE PRODUCTS

- Software products include user purchases of applications and systems packages for in-house computer systems. Included are lease and purchase expenditures, as well as expenditures for work performed by the vendor to implement and maintain the package at the user's sites. Expenditures for work performed by organizations other than the package vendor are counted in the category of professional services. There are several subcategories of software products, as indicated below and shown in detail in Exhibit B-2.
- APPLICATIONS PRODUCTS - Software that performs processing that services user functions. The products can be:
 - CROSS-INDUSTRY PRODUCTS - Used in multiple industry applications as well as in federal government sectors. Examples are payroll, inventory control, and financial planning.
 - INDUSTRY-SPECIALIZED PRODUCTS - Used in a specific federal government sector, such as planning, resource utilization, aircraft flight planning, military personnel training, and others. May also include some products designed to work in an industry other than the federal government, but applicable to specific government-performed commercial/industrial services, such as hospital information, vehicular fleet scheduling, electrical power generation and distribution, CAD/CAM, and others.
- SYSTEMS PRODUCTS - Software that enables the computer/communications system to perform basic functions. These products include:



EXHIBIT B-2

SOFTWARE PRODUCTS





- SYSTEM CONTROL PRODUCTS - Function during applications program execution to manage the computer system resources. Examples include operating systems, communication monitors, emulators, and spoolers.
- DATA CENTER MANAGEMENT PRODUCTS - Used by operations personnel to manage the computer systems resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, and utilities.
- APPLICATIONS DEVELOPMENT PRODUCTS - Used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Examples include languages, sorts, productivity aids, compilers, data dictionaries, data base management systems, report writers, project control systems, and retrieval systems.

5. HARDWARE AND HARDWARE SYSTEMS

- Hardware includes all ADP and telecommunications equipment that can be separately acquired by the government with or without installation by the vendor and not acquired as part of an integrated system. For the purpose of this report, hardware is grouped in three major categories: peripherals, terminals, and hardware systems (processors).
- PERIPHERALS - Includes all input, output, communications, and storage devices other than main memory that can be connected locally to the main processor and generally cannot be included in other categories such as terminals.
- INPUT DEVICES - Includes keyboards, numeric pads, card readers, light pens and track balls, tape readers, position and motion sensors, and analog-to-digital converters.



- OUTPUT DEVICES - Includes printers, CRTs, projection television screens, micrographics processors, digital graphics, and plotters.
- COMMUNICATION DEVICES - Modems, encryption equipment, special interfaces, and error control.
- STORAGE DEVICES - Includes magnetic tape (reel, cartridge, and cassette), floppy and hard disks, drums, solid state (integrated circuits), and bubble and optical memories.
- TERMINALS - Federal government systems use three types of terminals as described below.
 - USER-PROGRAMMABLE - Also called intelligent terminals, including:
 - Single-station or standalone.
 - Multi-station shared processor.
 - Teleprinter.
 - Remote batch.
 - NON-PROGRAMMABLE - Also called "dumb" terminals, including:
 - Single-station.
 - Multi-station shared processor.
 - Teleprinter.
 - LIMITED FUNCTION - Originally developed for specific needs, such as point-of-sale (POS), inventory data collection, controlled access, and other applications.



- HARDWARE SYSTEMS - Includes all processors from microcomputers to supercomputers. Hardware systems may require type- or model-unique operating software to be functional, but this category excludes applications software and peripheral devices, other than main memory and processors or CPUs not provided as part of an integrated (turnkey) system.
- MICROCOMPUTER - Combines all of the CPU, memory, and peripheral functions of an 8- or 16-bit computer on a chip in the form of:
 - Integrated circuit package.
 - Plug-in board with more memory and peripheral circuits.
 - Console including keyboard and interfacing connectors.
 - Personal computer with at least one external storage device directly addressable by the CPU.
 - An embedded computer which may take a number of shapes or configurations.
- MINICOMPUTER - Usually a 12-, 16-, or 32-bit computer which may be provided with limited applications software and support and may represent a portion of a complete large system.
 - Personal business computer.
 - Small laboratory computer.
 - Nodal computer in a distributed data network, remote data collection network, or connected to remote microcomputers.



- MIDICOMPUTER - Typically a 32- or 64-bit computer with extensive applications software and a number of peripherals in standalone or multiple-CPU configurations for business (administrative, personnel, and logistics) applications; also called a general-purpose computer.

- LARGE COMPUTER - Presently centered around storage controllers but likely to become bus-oriented and to consist of multiple processors or parallel processors. Intended for structured mathematical and signal processing and typically used with general-purpose, von-Neumann-type processors for system control.

- SUPERCOMPUTER - High-powered processors with numerical processing throughput that is significantly greater than the fastest general-purpose computers, with capacities in the 10-50 million floating point operations per second (MFLOPS) range. Newer supercomputers, with burst modes approaching 300 MFLOPS, main storage size up to 10 million words, and on-line storage in the one-to-three gigabyte class, are labeled Class IV to Class VI in agency long-range plans. Supercomputers fit in one of two categories.
 - REAL TIME - Generally used for signal processing in military applications.

 - NON-REAL TIME - For scientific use in one of three configurations:
 - Parallel processors.

 - Pipeline processor.

 - Vector processor.



- EMBEDDED COMPUTER - Dedicated computer system designed and implemented as an integral part of a weapon, weapon system, or platform; critical to a military or intelligence mission such as command and control, cryptological activities, or intelligence activities. Characterized by military specifications (MIL SPEC) appearance and operation, limited but reprogrammable applications software, and permanent or semi-permanent interfaces. May vary in capacity from microcomputers to parallel processor computer systems.

6. TELECOMMUNICATIONS

- NETWORKS - Electronic interconnection between sites or locations which may incorporate links between central computer sites and remote locations and switching and/or regional data processing nodes. Network services typically are provided on a leased basis by a vendor to move data, voice, video, or textual information between locations. Networks can be categorized in several different ways.
 - COMMON CARRIER NETWORK - A public access network, such as provided by AT&T, consisting of conventional voice-grade circuits and regular switching facilities accessed through dial-up calling with leased or user-owned modems for transfer rates between 150 and 1,200 baud.
 - VALUE-ADDED NETWORK (VAN) - Provided by vendors through common carrier or special-purpose transmission facilities with special features not available in the voice-grade switched public network. These include:
 - DEDICATED NETWORK - Also known as a private network, established and operated for one user or user organization using dedicated circuits to establish permanent connections between two or more stations.



- . PACKET SWITCHING - Real time network routing, transmitting, and receiving data in the form of addressed packets, each of which may be part of a message or include several messages without exclusive use of a network circuit by the transmitting and receiving stations.
- . MESSAGE SWITCHING - Non-real time process for routing messages through a network where a user message is received, stored, and forwarded from switch to switch through the network without an end-to-end circuit between sending and receiving stations; used primarily for data.
- LOCAL-AREA NETWORK (LAN) - Limited-access network between computing resources in a relatively small (but not necessarily contiguous) area, such as a building, complex of buildings, or buildings distributed within a metropolitan area. Users one of two signaling methods.
 - . BASEBAND - Signaling using digital waveforms on a single frequency band, usually at voice frequencies and bandwidth, limited to a single sender at any given moment. When used for local-area networks, typically implemented with TDM to permit multiple access.
 - . BROADBAND - Transmission facilities that use frequencies greater than normal voice-grade, supported in local-area networks with RF modems and AC signaling. Also known as wideband. Employs multiplexing techniques that increase carrier frequency between terminals to provide:
 - Multiple channels through FDM or TDM.

- High-speed data transfer via parallel mode at rates of up to 96,000 baud.
- TRANSMISSION FACILITIES - Includes wire, carrier, coaxial cable, micro-wave, optical fiber, satellites, cellular radio, and marine cable operating in one of two modes depending on the vendor and the distribution of the network.
- MODE - may be either:
 - ANALOG - Transmission or signal with continuous waveform representation, typified by AT&T's predominantly voice-grade DDD network and most telephone operating company distribution systems.
 - DIGITAL - Transmission or signal using discontinuous, discrete quantities to represent data, which may be voice, data, record, video, or text, in binary form.
- MEDIA - May be any of the following:
 - WIRE - Varies from earlier single-line teletype networks, to two-wire standard telephone (twisted pair), to four-wire full-duplex balanced lines.
 - CARRIER - A wave, pulse train, or other signal suitable for modulation by an information-bearing signal to be transmitted over a communications system, used in multiplexing applications to increase network capacity.
 - COAXIAL CABLE - A cable consisting of an insulated central conductor surrounded by a cylindrical conductor with additional insulation on the outside and covered with an outer sheath used in HF (high frequency)

and VHF (very high frequency), single frequency, or carrier-based systems; requires frequent reamplification (repeaters) to carry the signal any distance.

- MICROWAVE - UHF (ultra-high frequency) multi-channel, point-to-point, repeated radio transmission, also capable of wide frequency channels.
- OPTICAL FIBER - Local signal distribution systems employed in limited areas, using light-transmitting glass fibers and TDM for multi-channel applications.
- COMMUNICATIONS SATELLITES - Synchronous earth-orbiting systems that provide point-to-point, two-way service over significant distances without intermediate amplification (repeaters), but requiring suitable groundstation facilities for up- and down-link operation.
- CELLULAR RADIO - Network of fixed, low-powered two-way radios that are linked by a computer system to track mobile phone/data set units. Each radio serves a small area called a cell. The computer switches service connection to the mobile unit from cell to cell.

B. GENERAL DEFINITIONS

- 103/113 - Bell standard modem for low-speed transmission up to 300 bps, asynchronous, half or full duplex.
- 212 - Bell standard for medium-speed transmission at 1200 bps, asynchronous or synchronous, half or full duplex.



- ASCII - American National Standard Code for Information Interchange--eight-bit code with seven data bits and one parity bit.
- ASYNCHRONOUS - Communications operation (such as transmission) without continuous timing signals. Synchronization is accomplished through appending of signal elements to the data.
- BANDWIDTH - Range of transmission frequencies that can be carried on a communications path; used as a measure of capacity.
- BAUD - Number of signal events (discrete conditions) per second. Typically used to measure modem or terminal transmission speed.
- BENCHMARK - Method of testing proposed ADP system solutions for a specified set of functions (applications) employing simulated or real data inputs under simulated operating conditions.
- BPS - Bits per second--also mbps and kbps, million bits per second and thousand bits per second, respectively.
- BSC - IBM's binary synchronous communications data link protocol. First introduced in 1968 for use on point-to-point and multipoint communications channels. Frequently referenced as "bisync."
- BYTE - Usually equivalent to the storage required for one alphanumeric character (i.e., one letter or number).
- CBX - Computerized Branch Exchange--a PABX based on a computer system, implying programmability and usually voice and data capabilities.
- CENTRAL PROCESSING UNIT (CPU) - The arithmetic and control portion of a computer; i.e., the circuits controlling the interpretation and execution of computer instructions.



- CENTREX - Central office telephone service that permits local circuit switching without installation of customer premises equipment. Could be described as shared PBX service.
- CIRCUIT SWITCHING - A process that, usually on demand, connects two or more network stations and permits exclusive circuit use until the connection is released. Typical of the voice telephone network where a circuit is established between the caller and the called party.
- CO - Central Office--local telco site for one or more exchanges.
- CODEC - Coder/decoder, equivalent to modem for digital devices.
- CONSTANT DOLLARS - Growth forecasts in constant dollars make no allowance for inflation or recession. Dollar value based on the year of the forecast unless otherwise indicated.
- COMPUTER SYSTEM - The combination of computing resources required to perform the designed functions and which may include one or more CPUs, machine room peripherals, storage systems, and/or applications software.
- CPE - Customer Premises Equipment--DCE or DTE located at a customer site rather than at a carrier site such as the local telephone company CO. May include switchboards, PBX, data terminals, and telephone answering devices.
- CSMA/CD - Carrier sense multiple access/collision detect. Contention protocol used in local-area networks, typically with a multi-point configuration.
- CURRENT DOLLARS - Estimates or values expressed in current-year dollars which, for forecasts, would include an allowance for inflation.



- DATA ENCRYPTION STANDARD (DES) - 56-bit key, one-way encryption algorithm adopted by NBS in 1977, implemented through hardware ("S-boxes") or software. Designed by IBM with NSA guidance.
- DATAGRAM - A self-contained packet of information with a finite length that does not depend on the contents of preceding or following packets.
- DCA - IBM's Document Content Architecture--protocols for specifying document (text) format which are consistent across a variety of hardware and software systems within IBM's DISOSS.
- DCE - Data Circuit-terminating Equipment--interface hardware that couples DTE to a transmission circuit or channel by providing functions to establish, maintain, and terminate a connection, including signal conversion and coding.
- DDCMP - Digital Data Communications Message Protocol--data-link protocol used in Digital Equipment Company's DECNET.
- DECNET - Digital Equipment Company's network architecture.
- DEDICATED CIRCUIT - A permanently established network connection between two or more stations; contrast with switched circuit.
- DEMS - Digital electronic message service--nationwide common carrier digital networks which provide high-speed, end-to-end, two-way transmission of digitally-encoded information using the 10.6 GHz band.
- DIA - IBM's Document Interchange Architecture--protocols for transfer of documents (text) between different hardware and software systems within IBM's DISOSS.
- DISOSS - IBM's DIStributed Office Support System--office automation environment, based on DCA and DIA which permits document (text) transfer



between different hardware and software systems without requiring subsequent format or content revision.

- DISTRIBUTED DATA PROCESSING - The development of programmable intelligence in order to perform a data processing function where it can be accomplished most effectively through computers and terminals arranged in a telecommunications network adapted to the user's characteristics.
- DTE - Data Terminal Equipment--hardware which is a data source or sink or both, such as video display terminals that convert user information into data for transmission and reconvert data signals into user information.
- EBCDIC - Extended Binary Coded Decimal Interchange Code--eight-bit code typically used in IBM mainframe environments.
- EFT - Electronic funds transfer.
- ENCRYPTION - Electrical, code-based conversion of transmitted data to provide security and/or privacy of data between authorized access points.
- END USER - One who is using a product or service to accomplish his own functions. The end user may buy a system from the hardware supplier(s) and do his own programming, interfacing, and installation. Alternately, the end user may buy a turnkey system from a systems house or hardware integrator, or may buy a service from an in-house department or external vendor.
- ENGINEERING CHANGE NOTICE (ECN) - Product changes to improve the product after it has been released to production.
- ENGINEERING CHANGE ORDER (ECO) - The follow-up to ECNs--they include parts and a bill of materials to effect the change in the hardware.

- EQUIPMENT OPERATORS - Individuals operating computer control consoles and/or peripheral equipment (BLS definition).
- ETHERNET - Local-area network developed by Xerox PARC using baseband signaling, CSMA/CD protocol, and coaxial cable to achieve a 10 mbps data rate.
- FACSIMILE - Transmission and reception of data in graphic form, usually fixed images of documents, through scanning and conversion of a picture signal.
- FDM - Frequency Division Multiplexing--a multiplexing method that permits multiple access by assigning different frequencies of the available bandwidth to different channels.
- FEP - Front-End Processor--communications concentrator such as the IBM 3725 or COMTEN 3690 used to interface communications lines to host computers.
- FIELD ENGINEER (FE) - Field engineer, customer engineer, serviceperson, and maintenance person are used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.
- FULL-DUPLEX - Bi-directional communications with simultaneous two-way transmission.
- GENERAL-PURPOSE COMPUTER SYSTEM - A computer designed to handle a wide variety of problems. Includes machine room peripherals, systems software, and small business systems.
- HALF-DUPLEX - Bi-directional communications, but only in one direction at a time.

- HARDWARE INTEGRATOR - Develops system interface electronics and controllers for the CPU, sensors, peripherals, and all other ancillary hardware components. The hardware integrator also may develop control system software in addition to installing the entire system at the end-user site.
- HDLC - High-level Data Link Control.
- HERTZ - Number of signal oscillations (cycles) per second--abbreviated Hz.
- IBM TOKEN RING - IBM's local-area network using baseband signalling and operating at 4 mbps on twisted-pair copper wire. Actually a combination of star and ring topologies--IEEE 802.5 compatible.
- IDN - Integrated Digital Network--digital switching and transmission--part of the evolution to ISDN.
- INDEPENDENT SUPPLIERS - Suppliers of machine room peripherals--usually do not supply general-purpose computer systems.
- INFORMATION PROCESSING - Data processing as a whole, including use of business and scientific computers.
- INSTALLED BASE - Cumulative number of value (cost when new) of computers in use.
- INTERCONNECTION - Physical linkage between devices on a network.
- INTEROPERABILITY - The capability to operate with other devices on a network. To be contrasted with interconnection which merely guarantees a physical network interface.
- ISDN - Integrated Services Digital Network--integrated voice and non-voice public network service which is completely digital. Not clearly defined



through any existing standards although FCC is participating in the development of CCITT recommendations.

- KEYPUNCH OPERATORS - Individuals operating keypunch machines (similar in operation to electric typewriters) to transcribe data from source materials onto punch cards.
- LEASED LINE - Permanent connection between two network stations. Also known as dedicated or non-switched line.
- MACHINE REPAIRERS - Individuals who install and periodically service computer systems.
- MACHINE ROOM PERIPHERALS - Peripheral equipment that is generally located close to the central processing unit.
- MAINFRAME - The central processing unit (CPU or units in a parallel processor) of a computer that interprets and executes computer (software) instructions of 32 bits or more.
- MAP - Manufacturing Automation Protocol--seven-layer communications standard for factory environments promoted by General Motors/EDS. Adopts IEEE 802.2 and IEEE 802.4 standards plus OSI protocols for other layers of the architecture.
- MEAN TIME TO REPAIR - The mean of elapsed times from the arrival of the field engineer on the user's site until the device is repaired and returned to user service.
- MEAN TIME TO RESPOND - The mean of elapsed times from the user call for service and the arrival of the field engineer on the user's site.



- MESSAGE - A communication intended to be read by a person. The quality of the received document need not be high, only readable. Graphic materials are not included.
- MMFS - Manufacturing Messaging Format Standard--application-level protocol included within MAP.
- MODEM - A device that encodes information into electronically transmittable form (MODulator) and restores it to original analog form (DEModulator).
- NCP - Network Control Program--software used in IBM 3705/3725 FEPs for control of SNA networks.
- NODE - Connection point of three or more independent transmission points which may provide switching or data collection.
- OFF-LINE - Pertaining to equipment or devices that can function without direct control of the central processing unit.
- ON-LINE - Pertaining to equipment or devices under direct control of the central processing unit.
- OSI - ISO reference model for open systems interconnection--seven-layer architecture for application, presentation, session, transport, network, data link, and physical services and equipment.
- OSI APPLICATION LAYER - Layer 7, providing end-user applications services for data processing.
- OSI DATA LINK LAYER - Layer 2, providing transmission protocols, including frame management, link flow control, and link initiation/release.

- OSI NETWORK LAYER - Layer 3, providing call establishment and clearing control through the network nodes.
- OSI PHYSICAL LAYER - Layer 1, providing the mechanical, electrical, functional, and procedural characteristics to establish, maintain, and release physical connections to the network.
- OSI PRESENTATION LAYER - Layer 6, providing data formats and information such as data translation, data encoding/decoding, and command translation.
- OSI SESSION LAYER - Layer 5, establishes, maintains, and terminates logical connections for the transfer of data between processes.
- OSI TRANSPORT LAYER - Layer 4, providing end-to-end terminal control signals such as acknowledgements.
- OVERSEAS - Not within the geographical limits of the continental United States, Alaska, Hawaii, and U.S. possessions.
- PABX - Private Automated Branch Exchange--hardware that provides automatic (electro-mechanical or electronic) local circuit switching on a customer's premises.
- PAD - Packet Assembler Disassembler--a device that enables DTE not equipped for packet-switching operation to operate on a packet-switched network.
- PBX - Private Branch Exchange--hardware which provides local circuit switching on the customer premise.
- PCM - Pulse-Code Modulation--modulation involving conversion of a waveform from analog to digital form through coding.

- PDN - Public Data Network--a network established and operated by a recognized private operating agency, a telecommunications administration, or other agency for the specific purpose of providing data transmission services to the public.
- PERIPHERALS - Any unit of input/output equipment in a computer system, exclusive of the central processing unit.
- PPM - Pulse Position Modulation.
- PRIVATE NETWORK - A network established and operated for one user or user organization.
- PROGRAMMERS - Persons mainly involved in designing, writing, and testing of computer software programs.
- PROTOCOLS - The rules for communication system operation that must be followed if communication is to be effected. Protocols may govern portions of a network or service. In digital networks, protocols are digitally encoded as instructions to computerized equipment.
- PUBLIC NETWORK - A network established and operated for more than one user with shared access, usually available on a subscription basis. See related international definition of PDN.
- SCIENTIFIC COMPUTER SYSTEM - A computer system designed to process structured mathematics, such as Fast Fourier Transforms, and complex, highly redundant information, such as seismic data, sonar data, and radar, with large on-line memories and very high capacity throughput.
- SDLC - Synchronous data link control--IBM's data link control for SNA. Supports a subset of HDLC modes.

- SDN - Software-Defined Network.
- SECURITY - Physical, electrical, and computer (digital) coding procedures to protect the contents of computer files and data transmission from inadvertent or unauthorized disclosure to meet the requirements of the Privacy Act and national classified information regulations.
- SERVICE DELIVERY POINT - The location of the physical interface between a network and customer/user equipment.
- SIMPLEX - Unidirectional communications.
- SMART BOX - A device for adapting existing DTE to new network standards such as OSI. Includes PADs and protocol converters, for example.
- SNA - Systems Network Architecture--seven-layer communications architecture designed by IBM. Layers correspond roughly but not exactly to OSI model.
- SOFTWARE - Computer programs.
- SUPPLIES - Includes materials associated with the use or operations of computer systems, such as printer paper, keypunch cards, disk packs, and tapes.
- SWITCHED CIRCUIT - Temporary connection between two network stations established through dial-up procedures.
- SYNCHRONOUS - Communications operation with separate, continuous clocking at both sending and receiving stations.

- SYSTEMS ANALYST - Individual who analyzes problems to be converted to a programmable form for application to computer systems.
- SYSTEMS HOUSE - Vendor that acquires, assembles, and integrates hardware and software into a total turnkey system to satisfy the data processing requirements of an end user. The vendor also may develop systems software products for license to end users. The systems house vendor does not manufacture mainframes.
- SYSTEMS INTEGRATOR - Systems house vendor that develops systems interface electronics, applications software, and controllers for the CPU, peripherals, and ancillary subsystems that may have been provided by a contractor or the government (GFE). This vendor may either supervise or perform the installation and testing of the completed system.
- T1 - Bell System designation for 1.544 mbps carrier capable of handling 24 CM voice channels.
- TDM - Time Division Multiplexing--a multiplexing method that interleaves multiple transmissions on a single circuit by assigning a different time slot to each channel.
- TOKEN PASSING - Local-area network protocol which allows a station to transmit only when it has the "token," an empty slot on the carrier.
- TOP - Technical Office Protocol--protocol developed by Boeing Computer Services to support administrative and office operations as complementary functions to factory automation implemented under MAP.
- TURNKEY SYSTEM - System composed of hardware and software integrated into a total system designed to completely fulfill the processing requirements of a single application.



- TWISTED-PAIR CABLE - Communications cabling consisting of pairs of single-strand metallic electrical conductors, such as copper wires, typically used in building telephone wiring and some LANs.
- VERIFICATION AND VALIDATION - Process for examining and testing applications and special systems software to verify that it operates on the target CPU and performs all of the functions specified by the user.
- VOICE-GRADE - Circuit or signal in the 300-3300 Hz bandwidth typical of the public telephone system--nominally a 4 KHz circuit.
- VTAM - Virtual Telecommunications Access Method--host-resident communications software for SNA networks.

C. OTHER CONSIDERATIONS

- When questions arise as to the proper place to count certain user expenditures, INPUT addresses the questions from the user viewpoint. Expenditures then are categorized according to what the users perceive they are buying.







APPENDIX C: GLOSSARY OF FEDERAL ACRONYMS

- The federal government's procurement language uses a combination of acronyms, phrases, and words that is further complicated by different agency definitions. Terms of accounting, business, economics, engineering, and law are further complicated by new applications and technology.
- Acronyms and contract terms that INPUT encountered most often in program documentation and interviews for this report are included here, but this glossary should not be considered all-inclusive. Federal procurement regulations (DAR, FPR, FAR, FIRMR, FPMR) and contract terms listed in RFIs, RFPs, and RFQs provide applicable terms and definitions.
- Federal agency acronyms have been included to the extent they are employed in this report.
- Acronyms and terms that apply to the telecommunications industry and recent regulatory actions have been listed separately to highlight their specific application in this report.

A. ACRONYMS

- AAS Automatic Addressing System.
- AATMS Advanced Air Traffic Management System.



- ACO Administrative Contracting Offices (DCAS).
- ACS Advanced Communications Satellite (formerly NASA 30/20 GH₂ Satellite Program).
- ACT-I Advanced Computer Techniques (Air Force).
- Ada DoD High-Order Language.
- ADA Airborne Data Acquisition.
- ADL Authorized Data List.
- ADS Automatic Digital Switches (DCS).
- AFA Air Force Association.
- AFCEA Armed Forces Communications Electronics Association.
- AGE Aerospace Ground Equipment.
- AIP Array Information Processing.
- AMPE Automated Message Processing Equipment.
- AMPS Automated Message Processing System.
- AMSL Acquisition Management Systems List.
- ANSI American National Standards Institute.
- AP(P) Advance Procurement Plan.
- Appropriation Congressionally approved funding for authorized programs and activities of the Executive Branch.
- APR Agency Procurement Request.
- ARPANET DARPA Network of interconnected scientific computers.
- ATLAS Abbreviated Test Language for All Systems (for ATE-Automatic Test Equipment).
- Authorization In legislative process: programs, staffing, and other routine activities must be approved by Oversight Committees before the Appropriations Committee will approve the money from the budget.
- AUSA Association of the U.S. Army.
- AUTODIN AUTOMATIC Digital Network (of the Defense Communications System).
- AUTOVON AUTOMATIC VOICE Network of the Defense Communications System.

- BA Basic Agreement.
- BAFO Best And Final Offer.
- Base level Procurement, purchasing, and contracting at the military installation level.
- BCA Board of Contract Appeals.
- Benchmark Method of evaluating ability of a candidate computer system to meet user requirements.
- Bid protest Objection (in writing, before or after contract award) to some aspect of a solicitation by a valid bidder.
- BML Bidders Mailing List - qualified vendor information filed annually with federal agencies to automatically receive RFPs and RFQs in areas of claimed competence.
- BOA Basic Ordering Agreement.
- B&P Bid and Proposal - vendor activities in response to government solicitation/specific overhead allowance.
- BPA Blanked Purchase Agreement.
- BPE Best Preliminary Estimate.
- Budget Federal Budget, proposed by the President and subject to Congressional review.
- C² Command and Control.
- C³ Command, Control, and Communications.
- C⁴ Command, Control, Communications, and Computers.
- C³I Command, Control, Communications, and Intelligence.
- CAB Contract Adjustment Board or Contract Appeals Board.
- CADE Computer-Aided Design and Engineering.
- CADS Computer-Assisted Display Systems.
- CAIS Computer-Assisted Instruction System.
- CAPS Command Automation Procurement Systems.
- CAS Contract Administration Services or Cost Accounting Standards.
- CASB Cost Accounting Standards Board.
- CASP Computer-Assisted Search Planning.



- CBD Commerce Business Daily - publication of the U.S. Department of Commerce listing government contract opportunities and awards.
- CBO Congressional Budget Office.
- CCCR Contractor Cost Data Reporting.
- CCN Contract Change Notice.
- CCPDS Command Center Processing and Display Systems.
- CCPO Central Civilian Personnel Office.
- CCTC Command and Control Technical Center (JCS).
- CDR Critical Design Review.
- CDRL Contractor Data Requirements List.
- CFE Contractor-Furnished Equipment.
- CFR Code of Federal Regulations.
- CIG Computerized Interactive Graphics.
- CIR Cost Information Reports.
- CM Configuration Management.
- CMI Computer-Managed Instruction.
- CNI Communications, Navigation, Identification.
- CO Contracting Office, Contract Offices, or Change Order.
- COC Certificate of Competency (administered by Small Business Administration).
- COCO Contractor-Owned, Contractor-Operated.
- CODSIA Council of Defense and Space Industry Associations.
- COMSTAT Communications Satellite Corporation
- CONUS CONTinental United States.
- COP Capability Objectives Package.
- COTR Contracting Officer's Technical Representative.
- CP Communications Processor.
- CPAF Cost-Plus-Award-Fee Contract.
- CPFF Cost-Plus-Fixed-Fee Contract.
- CPIF Cost-Plus-Incentive-Fee Contract.
- CPR Cost Performance Reports.
- CPSR Contractor Procurement System Review.



- CR Cost Reimbursement (Cost Plus Contracts).
- CSA Combat or Computer Systems Architecture.
- C/SCSC Cost/Schedule Control System Criteria (also called "C"-Spec).
- CWAS Contractor Weighted Average Share in Cost Risk.
- DAL Data Accession List.
- DAR Defense Acquisition Regulations.
- DARPA Defense Advanced Research Projects Agency.
- DAS Data Acquisition System.
- DBHS Data Base Handling Systems.
- DCA Defense Communications Agency.
- DCAA Defense Contract Audit Agency.
- DCAS Defense Contract Administrative Services.
- DCASR DCAS Region.
- DCC Digital Control Computer.
- DCP Development Concept Paper (DoD).
- DCS Defense Communications System.
- DCTN Defense Commercial Telecommunications Network
- DDA Dynamic Demand Assessment (Delta Modulation).
- DDC Defense Documentation Center.
- DDL Digital Data Link.
- DDN Digital Data Network.
- DDS Dynamic Diagnostics System.
- D&F Determination and Findings - required documentation for approval of a negotiated procurement.
- DIA Defense Intelligence Agency.
- DHHS Department of Health and Human Services.
- DIDS Defense Integrated Data Systems.
- DISC Defense Industrial Supply Center.
- DLA Defense Logistics Agency.
- DMA Defense Mapping Agency.
- DNA Defense Nuclear Agency.

- DO Delivery Order.
- DOA Department of Agriculture (also USDA).
- DOC Department of Commerce.
- DOE Department of Energy.
- DOI Department of Interior.
- DOJ Department of Justice.
- DOS Department of State.
- DOT Department of Transportation.
- DPA Delegation of Procurement Authority (granted by GSA under FPRs).
- DPC Defense Procurement Circular.
- DQ Definite Quantity Contract.
- DQ/PL Definite Quantity Price List Contract.
- DR Deficiency Report.
- DSN Defense Switched Network.
- DSP Defense Support Program (WWMCCS).
- DSS Defense Supply Service.
- DTC Design-to-Cost.
- ECP Engineering Change Proposal.
- ED Department of Education.
- EEO Equal Employment Opportunity.
- 8(a) Set-Aside Agency awards direct to Small Business Administration for direct placement with a socially/economically disadvantaged company.
- EMC Electro-Magnetic Compatibility.
- EMCS Energy Monitoring and Control System.
- EO Executive Order - Order ISS by the President.
- EOQ Economic Ordering Quantity.
- EPA Economic Price Adjustment.
- EPA Environmental Protection Agency.
- EPMR Estimated Peak Monthly Requirement.



- EPS Emergency Procurement Service (GSA) or Emergency Power System.
- FA Formal Advertising.
- FAC Facility Contract.
- FAR Federal Acquisition Regulations.
- FCA Functional Configuration Audit.
- FCC Federal Communications Commission.
- FCDC Federal Contract Data Center.
- FCRC Federal Contract Research Center.
- FDPC Federal Data Processing Centers.
- FEDSIM Federal (Computer) Simulation Center (GSA).
- FEMA Federal Emergency Management Agency.
- FFP Firm Fixed-Price Contract (also Lump Sum Contract).
- FIPS NBS Federal Information Processing Standard.
- FIPS-PUBS Federal Information Processing Standards Publications.
- FIRMR Federal Information Resource Management Regulations.
- FMS Foreign Military Sales.
- FOC Final Operating Capability.
- FOIA Freedom of Information Act.
- FP Fixed-Price Contract.
- FP-L/H Fixed-Price - Labor/Hour Contract.
- FP-LOE Fixed-Price - Level-of-Effort Contract.
- FPMR Federal Property Management Regulations.
- FPR Federal Procurement Regulations.
- FSC Federal Supply Classification.
- FSG Federal Supply Group.
- FSN Federal Stock Number.
- FSS Federal Supply Schedule or Federal Supply Service (GSA).
- FSTS Federal Secure Telecommunications System.
- FT Fund A revolving fund, designated as the Federal Telecommunications Fund, used by GSA to pay for GSA-provided common-user services, specifically including the current FTS and proposed FTS 2000 services.



- FTPS Federal Telecommunications Standards Program administered by NCS; standards are published by GSA.
- FTS Federal Telecommunications System.
- FTS 2000 Proposed replacement for the Federal Telecommunications System.
- FY Fiscal Year.
- FYDP Five-Year Defense Plan.
- GAO General Accounting Office.
- GFE Government-Furnished Equipment.
- GFM Government-Furnished Material.
- GFY Government Fiscal Year (October to September).
- GIDEP Government-Industry Data Exchange Program.
- GOCO Government Owned - Contractor Operated.
- GOGO Government Owned - Government Operated.
- GPO Government Printing Office.
- GPS Global Positioning System.
- GS General Schedule.
- GSA General Services Administration.
- HPA Head of Procuring Activity.
- HSDP High-Speed Data Processors.
- HUD (Department of) Housing and Urban Development.
- ICA Independent Cost Analysis.
- ICAM Integrated Computer-Aided Manufacturing.
- ICE Independent Cost Estimate.
- ICP Inventory Control Point.
- ICST Institute for Computer Sciences and Technology, National Bureau of Standards, Department of Commerce.
- IDAMS Image Display And Manipulation System.
- IDEP Interservice Data Exchange Program.
- IDN Integrated Data Network.



- IFB Invitation For Bids.
- IOC Initial Operating Capability.
- IOI Internal Operating Instructions.
- IQ Indefinite Quantity contract.
- IR&D Independent Research & Development.
- IRM Information Resource Manager.
- IXS Information Exchange System.

- JOCIT JOVIAL Compiler Implementation Tool.
- JSIPS Joint Systems Integration Planning Staff.
- JSOP Joint Strategic Objectives Plan.
- JSOR Joint Service Operational Requirement.
- JUMPS Joint Uniform Military Pay System.

- LC Letter Contract.
- LCC Life Cycle Costing.
- LCMP Life Cycle Management Procedures (DD7920.1).
- LCMS Life Cycle Management System.
- L-H Labor-Hour Contract.
- LOI Letters of Interest.
- LRPE Long-Range Procurement Estimate.

- MAISRC Major Automated Information Systems Review Council.
- MANTECH MANufacturing TECHnology.
- MAPS Multiple Address Processing System.
- MASC Multiple Award Schedule Contract.
- MDA Multiplexed Data Accumulator.
- MENS Mission Element Need Statement or Mission Essential Need Statement (see DD-5000.1 Major System Acquisition).
- MILSCAP Military Standard Contract Administration Procedures.
- MIL SPEC Military Specification.
- MIL STD Military Standard.
- MIPR Military Interdepartmental Purchase Request.



- MOD Modification.
- MOL Maximum Ordering Limit (Federal Supply Service).
- MPC Military Procurement Code.
- MYP Multi-Year Procurement.

- NARDIC Navy Research and Development Information Center.
- NASA National Aeronautics and Space Administration.
- NBS National Bureau of Standards.
- NCMA National Contract Management Association.
- NCS National Communications System; responsible for setting U.S. Government standards administered by GSA; also holds primary responsibility for emergency communications planning.

- NICRAD Navy-Industry Cooperative Research and Development.
- NIP Notice of Intent to Purchase.
- NMCS National Military Command System.
- NSA National Security Agency.
- NSEP National Security and Emergency Preparedness.
- NSF National Science Foundation.
- NSIA National Security Industrial Association.
- NTIA National Telecommunications and Information Administration of the Department of Commerce; replaced the Office of Telecommunications Policy in 1970 as planner and coordinator for government communications programs; primarily responsible for radio.

- NTIS National Technical Information Services.

- Obligation "Earmarking" of specific funding for a contract, from committed agency funds.
- OCS Office of Contract Settlement.
- OFCC Office of Federal Contract Compliance.
- Off-Site Services to be provided near, but not on/in government facility.



- OFMP Office of Federal Management Policy (GSA).
- OFPP Office of Federal Procurement Policy.
- OIRM Office of Information Resources Management.
- O&M Operations & Maintenance.
- OMB Office of Management and Budget.
- O,M&R Operations, Maintenance & Repair.
- On-Site Services (nonpersonal) to be performed on a government installation (or in a specified building).
- OPM Office of Procurement Management (GSA) or Office of Personnel Management.
- Options Sole-source additions to the base contract for services or goods, to be exercised at the government's discretion.
- OSHA Occupational Safety and Health Act.
- OSP Offshore Procurement.
- OTA Office of Technology Assessment (Congress).
- Out-Year Proposed funding for fiscal years beyond the Budget Year (next fiscal year).
- P-I FY Defense Production Budget.
- P³I Pre-Planned Product Improvement (program in DoD).
- PAR Procurement Authorization Request or Procurement Action Report.
- PAS Pre-Award Survey.
- PASS Procurement Automated Source System.
- PCO Procurement Contracting Officer.
- PDA Principal Development Agency.
- PDM Program Decision Memorandum.
- PDR Preliminary Design Review.
- PIR Procurement Information Reporting.
- PME Performance Monitoring Equipment.
- PMP Program Management Plan.
- PO Purchase Order or Program Office.
- POM Program Objective Memorandum.



- PPBS Planning, Programming, Budgeting System.
 - PPM Pulse Position Modulation.
 - PR Purchase Request or Procurement Requisition.
 - PS Performance Specification - alternative to a Statement of Work, when work to be performed can be clearly specified.
-
- QA Quality Assurance.
 - GAO Quality Assurance Office.
 - QMCS Quality Monitoring and Control System (DoD Software).
 - QMR Qualitative Material Requirement (Army).
 - GPL Qualified Products List.
 - QRC Quick Reaction Capability.
 - QRI Quick Reaction Inquiry.
-
- R-I FY RDT&E Budget.
 - RAM Reliability, Availability, and Maintainability.
 - RC Requirements Contract.
 - R&D Research & Development.
 - RDA Research, Development, and Acquisition.
 - RDD Required Delivery Date.
 - RD&E Research, Development, and Engineering.
 - RDF Rapid Deployment Force.
 - RDT&E Research, Development, Test & Engineering.
 - RFI Request For Information.
 - RFP Request For Proposal.
 - RFQ Request For Quotation.
 - RFTP Request For Technical Proposals (Two-Step).
 - ROC Required Operational Capability.
 - ROI Return On Investment.
 - RTAS Real Time Analysis System.
 - RTDS Real Time Display System.



- SA Supplemental Agreement.
- SBA Small Business Administration.
- SB Set-Aside Small Business Set-Aside contract opportunities with bidders limited to certified small businesses.
- SCA Service Contract Act (1964 as amended).
- SCN Specification Change Notice.
- SDN Secure Data Network.
- SEC Securities and Exchange Commission.
- SE&I Systems Engineering and Integration.
- SETA Systems Engineering/Technical Assistance.
- SETS Systems Engineering/Technical Support.
- SIBAC Simplified Intragovernmental Billing and Collection System.
- SIMP Systems Integration Master Plan.
- SIOP Single Integrated Operations Plan.
- SNAP Shipboard Nontactical ADP Program.
- Sole Source Contract award without competition.
- Solicitation Invitation to (submit a) bid.
- SOR Specific Operational Requirement.
- SOW Statement of Work (negotiated procurements).
- SSA Source Selection Authority (DoD).
- SSAC Source Selection Advisory Council.
- SSEB Source Selection Evaluation Board.
- SSO Source Selection Official (NASA).
- STINFO Scientific and Technical INFORMATION Program - Air Force/NASA.
- STU Secure Telephone Unit.
- SWO Stop-Work Order.
- Synopsis Brief description of contract opportunity in CBD after D&F and before release of solicitation.
- TA/AS Technical Assistance/Analyst Services.
- TEMPEST DoD techniques to inhibit unintentional electromagnetic radiation.



- TILO Qualified Requirements Information Program - Army.
 - TM Time and Materials contract.
 - TOA Total Obligational Authority (Defense).
 - TOD Technical Objective Document.
 - TR Temporary Regulation (added to FPR, FAR).
 - TRACE Total Risk Assessing Cost Estimate.
 - TRCO Technical Representative of the Contracting Offices.
 - TREAS Department of Treasury.
 - TRP Technical Resources Plan.
 - TSP Teleprocessing Services Program (GSA).
 - TVA Tennessee Valley Authority.
-
- UCAS Uniform Cost Accounting System.
 - USA U.S. Army.
 - USAF U.S. Air Force.
 - USCG U.S. Coast Guard.
 - USMC U.S. Marine Corps.
 - USN U.S. Navy.
 - U.S.C. United States Code.
 - USPS United States Postal Service.
 - USRRB United States Railroad Retirement Board.
-
- VA Veterans Administration.
 - VE Value Engineering.
 - VHSIC Very High Speed Integrated Circuits.
 - VIABLE Vertical Installation Automation BaseLine (Army).
 - VICI Voice Input Code Identifier.
-
- WBS Work Breakdown Structure.
 - WGM Weighted Guidelines Method.
 - WIN WWMCCS Intercomputer Network.
 - WIS WWMCCS Information Systems.



- WS Work Statement - Offerer's description of the work to be done (proposal or contract).
- WWMCCS WorldWide Military Command and Control System.

B. GENERAL AND INDUSTRY

- ADP Automatic Data Processing.
- ADPE Automatic Data Processing Equipment.
- ANSI American National Standards Institute.
- CAD Computer-Aided Design.
- CAM Computer-Aided Manufacturing.
- CBEMA Computer and Business Equipment Manufacturers Association
- COBOL COMmon Business-Oriented Language.
- CPU Central Processor Unit.
- DBMS Data Base Management System.
- EIA Electronic Industries Association.
- IEEE Institute of Electrical and Electronics Engineers.
- LSI Large-Scale Integration.
- PROM Programmable Read-Only Memory.
- UPS Uninterruptable Power Source.
- VLSI Very Large Scale Integration.



C. TELECOMMUNICATIONS ACRONYMS AND TERMS

- BOC Bell Operating Company.
- CCIR International Radio Consultative Committee; similar to CCITT only for radio transmission.
- CCITT Comite Consultatif Internationale de Telegraphique et Telephonique; Committee of the International Telecommunication Union.
- Computer Inquiry I 1970 FCC proceedings on regulation of the communications industry.
- Computer Inquiry II 1980 FCC proceedings which resulted in the AT&T divestiture and rulings that deregulated telecommunications equipment and "enhanced" service.
- Computer Inquiry III 1985 FCC reopening of previous Inquiry to review structural separation requirements and impacts of CI II decisions.
- DDD Direct Distance Dialing; long distance dialing without operator or attendant intervention.
- IDDD International Direct Distance Dialing; international form of DDD.
- INTELSAT International Telecommunications Satellite Organization.
- Inter-LATA Service between LATAs; under the terms of the AT&T divestiture inter-LATA service may be provided by AT&T or the OCCs, but not by the BOCs.
- Intra-LATA Service provided within a LATA; under the terms of the AT&T divestiture this service is provided by the BOCs and other local telcos.



- IRC International Record Carriers.
- ISO International Organization for Standardization; voluntary international standards organization and member of CCITT.
- ITU International Telecommunication Union.
- LATA Local Access and Transport Area; one of 187 geographical areas defined in the AT&T divestiture agreement as a local telephone service area.
- MFJ Modified Final Judgment; formal designation of the AT&T divestiture agreement.
- OCC Other Common Carriers; collective reference to the non-AT&T common carrier companies.
- PCM Pulse Code Modulation.
- PPM Pulse Position Modulation.
- PTT Post, Telegraph, and Telephone; government authority in most countries that provides data transmission facilities to the public.
- RBOC Regional Bell Operating Company; one of the seven regional holding companies set up during divestiture for the local Bell telcos (BOCs)--NYNEX, US West, Ameritech, Bell South, Bell Atlantic, Pacific Telesis, and Southwestern Bell.
- RCCA Record Carrier Competition Act of 1982; opened domestic record (telegraph) service to competition from IRCs and removed restrictions on Western Union from becoming an IRC.
- TDMA Time Division Multiple Access.
- Telco TELEphone Company.
- WATS Wide Area Telecommunications Services.













APPENDIX D: POLICIES, REGULATIONS, AND STANDARDS

A. OMB CIRCULARS

- A-11 Preparation and Submission of Budget Estimates.
- A-49 Use of Management and Operating Contracts.
- A-71 Responsibilities for the Administration and Management of Automatic Data Processing Activities.
- A-76 Policies for Acquiring Commercial or Industrial Products and Services Needed by the Government.
- A-109 Major Systems Acquisitions.
- A-120 Guidelines for the Use of Consulting Services.
- A-121 Cost Accounting, Cost Recovery, and Integrated Sharing of Data Processing Facilities.

B. GSA PUBLICATIONS

- The FIRMR as published by GSA is the primary regulation for use by federal agencies in the management, acquisition, and use of both ADP and telecommunications information resources.
- Certain parts of the FIRMR are particularly applicable to federal telecommunications systems. These include:



- 201-8 Implementation and Use of Federal Standards.
 - 201-21 Telecommunications Management Programs.
 - 201-38 Management of Telecommunications Resources.
 - 201-39 Major Changes and New Installation of Telecommunications Resources.
 - 201-40 Contracting for Telecommunications Resources.
 - 201-41 Routine Changes and Use of the Federal Telecommunications System.
- The following Bulletins in Appendix B of the FIRMR provide additional guidance.
 - 4 Federal Communications Centers.
 - 14 GSA Electronic Maintenance, Repair, and Engineering Rates (includes discussion of FSTS).
 - 16 Travel by Federal Telecommunications System.
 - 17 Acquisition and Installation of Small Telephone Systems.
 - 20 GSA Contracts for the Purchase of Telephones and Services (POTS).
 - 25 ADP and Telecommunications Standards Index.
 - 29 FTS 2000.

C. DoD DIRECTIVES

- DD-5000.1 Major System Acquisitions.
- DD-5000.2 Major System Acquisition Process.
- DD-5200.1 DoD Information Security Program.
- DD-5000.31 Interim List of DoD-Approved High-Order Languages.
- DD-5000.35 Defense Acquisition Regulatory Systems.
- DD-7920.1 Life Cycle Management of Automated Information (AIS).
- DD-7920.2 Major Automated Information Systems Approval Process.



D. STANDARDS

- ADCCP Advanced Data Communications Control Procedures; ANSI standard X3.66 of 1979; also NBS FIPS 71.

- CCITT G.711 International PCM standard.
- CCITT T.0 International standard for classification of facsimile apparatus for document transmission over telephone-type circuits.

- DEA-1 Proposed ISO standard for data encryption based on the NBS DES.

- EIA RS-170 Monochrome video standard.
- EIA RS-170A Color video standard.
- EIA RS-464 EIA PBX standards.
- EIA RS-465 Standard for Group III facsimile.
- EIA RS-466 Facsimile standard; procedures for document transmission in the general switched telephone network.
- EIA RS232-C EIA DCE to DTE interface standard using a 25-pin connector; similar to CCITT V.24.
- EIA RS449 New EIA standard DTE to DCE interface which replaces RS232-C.

- FED-STD 1000 Proposed Federal Standard for adoption of the full OSI reference model.
- FED-STD 1026 Federal Data Encryption Standard (DES) adopted in 1983; also FIPS 46.
- FED-STD 1041 Equivalent to FIPS 100.
- FED-STD 1061 Group II facsimile standard (1981).
- FED-STD 1062 Federal standard for Group III facsimile; equivalent to EIA RS-465.



- FED-STD 1063 Federal facsimile standard equivalent to EIA RS-466.
- FED-STDs 1005, 1005A - 1008 Federal standards for DCE coding and modulation.
- FIPS 46 NBS Data Encryption Standard (DES).
- FIPS 81 DES Modes of Operation.
- FIPS 100 NBS standard for packet-switched networks; subset of CCITT X.25.
- FIPS 107 NBS standard for local-area networks, similar to IEEE 802.2 and 802.3.
- IEEE 802.2 OSI-compatible IEEE standard for data-link control in local-area networks.
- IEEE 802.3 Local-area network standard similar to Ethernet.
- IEEE 802.4 OSI-compatible standard for token-bus local-area networks.
- IEEE 802.5 Local-area network standard for token-ring networks.
- TCP/IP Transmission Control Protocol/Internet Protocol; DoD transport protocol standard (MIL-STD-1778).
- X.21 CCIT standard for interface between DTE and DCE for synchronous operation on public data networks.
- X.25 CCITT standard for interface between DTE and DCE for terminals operating in the packet mode on public data networks.
- X.75 CCITT standard for links that interface different packet networks.
- X.400 ISO application-level standard for the electronic transfer of messages (electronic mail).









APPENDIX E: RELATED INPUT REPORTS

A. ANNUAL MARKET ANALYSES

- Procurement Analysis Reports, GFY 1985-1990.
- U.S. Information Services Vertical Markets, 1985-1990.
- U.S. Information Services Cross-Industry Markets, 1985-1990.

B. INDUSTRY SURVEYS

- Directory of Leading U.S. Information Services Vendors.
- Eighteenth Annual ADAPSO Survey of the Computer Services Industry - 1984.

C. TELECOMMUNICATIONS MARKET REPORTS

- Micro-Mainframe: Telecommunications - 1984.
- Strategies for New Telecommunications Opportunities - 1984.



D. TELECOMMUNICATIONS PLANNING

- Integrated Voice/Data Communications - 1985.
- LAN/CBX: Planning for Change - 1985.
- Telecommunications Security - 1985.
- LAN/CBX Trends: Decision Processes for Users - 1984.
- Telecommunications Annual Planning Report - 1984.
- Telecommunications Strategic Planning - 1984.





APPENDIX F

INTERVIEW QUESTIONNAIRES

A. Telecommunications - Agency

- 1.a. Based on our review of your agency's A-11 submissions, the following major programs are proposed for adding to or improving your agency's telecommunications over the next 5 years. (Read list from table below) Is this list current and complete?

_____ YES _____ NO

(If YES go to Question 1.c)

- b. (If NO)

What programs should be added or removed?

- c. Which of these are ongoing? Expansions? Upgrades?
Replacements? New?

- d. What types of telecommunications service are they expected to provide?
(e.g., private or public network, switched, dedicated,
VAN)

<u>PROGRAM</u>	<u>TYPE</u>	<u>TYPE OF SYSTEM/SERVICE</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____



- e. Do these programs provide all of the telecommunications support needed by your agency, including data communications?

_____ YES _____ NO

(If YES, go to Question 3)

2. (If NO)

- a. What other programs include telecommunications systems and services?
- b. Which of these are ongoing? Expansions? Upgrades? Replacements? New?
- c. What types of telecommunications services will be included?

<u>PROGRAM</u>	<u>TYPE</u>	<u>TYPE OF SYSTEM/SERVICE</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____



- d. What percentage of the program budget for each program will be used to acquire the following telecommunications systems and services?

<u>PROGRAM</u>	<u>HARDWARE</u>	<u>SOFTWARE</u>	<u>PROFESSIONAL SERVICES</u>	<u>LEASED TELE- COMMUNICATION</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

3. a. Have the 5-year budget forecasts for any of these programs (in Questions 1 and 2) changed since October 1984?

_____ YES _____ NO

(If NO go to-Question 4)

- b. (If YES) In what ways?

<u>PROGRAM</u>	<u>CHANGE</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____



4.a. Does your agency currently use LANs?

_____ YES _____ NO

(If NO go to Question 4.d)

b. (If YES to 4.a) Do you plan to change any of these LANs over the next 5 years?

_____ YES _____ NO

c. (If YES to 4.b) Please identify each of these LANs, the type of change (expand, upgrade, replace), the size of the LAN

(geographical dispersion and number of workstations), vendor,

protocol (e.g., baseband token ring), and applications

supported on the LAN.

<u>Identification</u>	<u>Geographical</u>	<u>SIZE</u>	<u>Vendor</u>	<u>Protocol</u>	<u>Applica-</u> <u>tions</u>
		<u>#Workstations</u>			
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

d. Do you plan to implement any new LANs over the next 5 years?

_____ YES _____ NO

(If NO go to Question 5)



- e. (If YES to 4.d) Please identify each of these LANs, the size of the LAN (geographical dispersion and number of workstations), the fiscal year start, and applications to be supported on the LAN.

<u>Identification</u>	<u>Geographical</u>	<u>SIZE</u> <u>#Workstations</u>	<u>Year</u>	<u>Applications</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

- 5.a. Does your agency have network control centers?

_____ YES _____ NO

(If NO go to Question 5.d)

- b. (If YES to 5.a)

Are these centers centralized or decentralized?

_____ CENTRALIZED _____ DECENTRALIZED

- c. (If YES to 5.a)

Do these centers control and monitor communications networks?

<u>CENTER</u>	<u>CONTROL/MONITOR</u>	<u>MONITOR ONLY</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

- d. Do you plan to implement new network control centers over the next 5 years?

_____ YES _____ NO

(If NO go to Question 6)

- e. (If YES to 5.d)

Will these centers be centralized or decentralized?

_____ CENTRALIZED _____ DECENTRALIZED

f. (if YES to 5.d)

When might these centers be implemented?

g. (If YES to 5.d)

Will these centers control and monitor communications networks?

<u>CENTER</u>	<u>YEAR</u>	<u>CONTROL/MONITOR</u>	<u>MONITOR ONLY</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

6.a. Does your agency currently use VANs?

_____ YES _____ NO

6.b. Does your agency plan to use VANs over the next 5 years?

_____ YES _____ NO

6.c. How would the availability of VAN service under the TSP/MASC alter your planned usage over the next 5 years?

_____ INCREASE _____ DECREASE _____ NO CHANGE

6.d. What would be the advantages and disadvantages for your agency of acquiring VAN service under the TSP/MASC?

Advantages

Disadvantages

7. What standards are in effect now or might be applied to the following types of communications facilities?

	<u>CURRENT</u>	<u>FUTURE(1991)</u>
Terminals	_____	_____
Switches	_____	_____
Transmissions	_____	_____
Interfaces	_____	_____
LANs	_____	_____

8. What special communications requirements does your agency have?

- 9.a. Could you estimate the relative proportions of voice and data communications used by your agency?

	<u>CURRENT</u>	<u>FUTURE(1991)</u>
VOICE	_____	_____
DATA	_____	_____

- b. If the proportion of data communications is increasing, what is the maximum percentage you foresee and when might this occur?

Maximum Percentage _____ Year _____

- 10a. Could you estimate the relative proportions of analog and digital communications used by your agency?

	<u>CURRENT</u>	<u>FUTURE(1991)</u>
Analog	_____	_____
Digital	_____	_____

- b. If the proportion of digital communications is increasing, what is the maximum percentage you foresee and when will this occur?

Maximum Percentage _____ Year _____

- 11a. Do you currently have a long range plan or strategy for telecommunications systems and services?

_____ YES _____ NO

(If NO go to Question 11)

- b. (If YES to 10.a)

What are the key elements of the strategy?

- c. (If YES to 10.a)

Can we see the plan or obtain a copy?

_____ YES _____ NO

(If NO go to Question 11)

- d. (If YES to 10. c)

Where and When?

12. How are telecommunications systems and services planned, acquired, and managed in your agency? (e.g., centralized or decentralized, voice and data together or separately)



- 13.a. What percentage of your agency's communications requirements are met currently by government networks?

FTS _____
Autovon _____
Autodin _____
DDN _____
Other _____

- b. Assuming that FTS 2000 is approved and implemented on schedule (by 1990), including the WITS and ASP components, what percentage of your agency's communications requirements could be met by these systems in 1991?

Percentage _____

- 14.a. Does your agency have a preference for leasing or purchasing telecommunications hardware and software?

Lease _____ Purchase _____ No _____

- b. Could you estimate the percentage of telecommunications hardware and software acquisitions in each category, currently and over the next 5 years?

	<u>Current</u>		<u>Future (1991)</u>	
	<u>Lease</u>	<u>Purchase</u>	<u>Lease</u>	<u>Purchase</u>
Hardware	_____	_____	_____	_____
Software	_____	_____	_____	_____

15. How does your agency plan to acquire additional, improved, or new telecommunications systems and services?

_____ Use GSA or DCA sponsored facilities
_____ Buy integrated (common carrier) services
_____ Buy VAN services
_____ Buy integrated systems (including hardware, software, circuits/transmission facilities, and service)
_____ Buy components and integrate in-house
_____ Buy components and use a design or integration contractor

16. What should vendors provide during the next 5 years to make their telecommunications systems and services more valuable to your agency?



17. What technological changes might alter the way your agency meets its telecommunications needs?
- _____
- _____
- _____
- _____
18. Could you identify those (non-technical) factors that would have the greatest impact on your agency's telecommunications plans?
- _____
- _____
- _____
- _____
19. Who else in your agency should we interview to gain a better understanding of your needs?
- _____
- _____
- _____
- _____



B. Telecommunications - Vendor

- 1.a. Does your company now provide or plan to provide telecommunications systems or services to the Federal Government? _____ YES _____ NO

(If NO, close interview)

- b. (If YES to 1.a)

What types of systems or services do you now provide or plan to provide?

	<u>CURRENT</u>	<u>PLANNED</u>
HARDWARE	_____	_____
SOFTWARE	_____	_____
PROFESSIONAL SERVICES	_____	_____
NETWORK SERVICES	_____	_____

(If the vendor company provides professional services only go to Question 3)

2. What standards are supported currently or will be supported by your company for the following types of communications facilities?

	<u>CURRENT</u>	<u>FUTURE (1991)</u>
TERMINALS	_____	_____
SWITCHES	_____	_____
TRANSMISSION	_____	_____
INTERFACES	_____	_____
LANs	_____	_____

- 3.a. Do you believe that the Federal telecommunications market will increase or decrease over the next 2-5 years?

_____ Decrease _____ Stay the same _____ Increase



- b. If decreasing or increasing, for which particular types of applications, systems, or services?

- c. Why?

- 4.a. In your opinion, which agencies provide the most attractive opportunities for telecommunications systems and services?

- b. Why?

- 5.a. In your opinion, which agencies appear to be less attractive opportunities for telecommunications systems and services?

- b. Why?



- 6.a. Government agencies have several alternatives available for changing or adding to their telecommunications resources. Which of the following alternatives do you believe is likely to be most significant over the next 5 years?

_____ Use of GSA or DCA-sponsored facilities
_____ Buying integrated (common carrier) services
_____ Buying VAN services
_____ Buying integrated systems (including hardware, software, circuits/transmission facilities, and service)
_____ Buying components and integrating in-house
_____ Buying components and using a design or integration contractor

- 7.a. Does your company supply or plan to supply VAN services to the Federal Government?

_____ YES _____ NO

(If NO, go to Question 8)

- b. (If YES to 7.a)

GSA is considering making VAN services available under the TSP/MASC. Would your company prefer to see VAN services offered to the Government in this way?

_____ YES _____ NO _____ NO PREFERENCE

- c. What would be the advantages and disadvantages for Federal agencies of acquiring VAN service under the TSP/MASC?

ADVANTAGES

DISADVANTAGES

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____



d. What would be the advantages and disadvantages for VAN vendors?

ADVANTAGES

DISADVANTAGES

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

8.a. GSA has proposed complete replacement of the existing FTS with FTS-2000 by 1990. Are you familiar with this proposed acquisition?

_____ YES _____ NO

b. Do you believe that centralization of Federal telecommunications is in the best interest of the Government and the individual agencies?

_____ YES _____ NO (Government Overall)

_____ YES _____ NO (Individual Agencies)

c. In your opinion, what kind of impact will the FTS-2000 acquisition have on telecommunications vendors over the next 5 years?

9. What do you believe vendors need to do over the next 5 years to make their telecommunications systems and services more valuable to the Government?



10. What do you believe the Government needs to do over the next 5 years to improve its acquisitions of telecommunications systems and services?

11. What technological changes might alter the way the Government meets its telecommunications needs?

12. Could you identify those non-technical factors that would have the greatest impact on Government telecommunications acquisitions?

- 13.a. What was your company's total information systems and services revenue from Federal business during your most recent fiscal year?

\$ _____ FY _____

- b. What percentage of this Federal revenue was for the following telecommunications systems and services?

_____	Overall
_____	Hardware
_____	Software
_____	Professional Services
_____	Network Services

14. Could you please provide the following information on major telecommunications projects where your company is either a prime or support contractor?



[illegible]

SUPPORT CONTRACTS

[illegible]



About INPUT

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